



An Economic Assessment of Kirwan Commission Recommendations

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Sage Policy Group, Inc.

Commissioned by: Strong Schools Maryland



Executive Summary

➤ *Translating Educational Outcomes into Economic Ones*

What are the Economic Implications of Educational Reform in Maryland?

Strong Schools Maryland commissioned Sage Policy Group, Inc. (Sage) to assess the economic and fiscal implications of recommendations promulgated by the Maryland Commission on Innovation & Excellence in Excellence, more commonly known as the Kirwan Commission. This report takes no view regarding the merit of any individual recommendation nor their collective appeal.

Rather, this is purely an exercise in translation. In the process of advancing a set of reforms to public education in Maryland, Commission members also established the likely level of improvement in academic performance if recommendations are implemented with fidelity. Sage has endeavored to map those educational improvements to economic and fiscal ones, establishing the State's payback period in the process.

There are a number of reasons that better educational outcomes translate into superior economic ones:

- Higher educational attainment is associated with higher lifetime incomes. The net present value of the lifetime earnings of someone with less than a high school diploma is roughly \$450,000. That figure increases to \$950,000 for someone who attends some college or obtains an associate degree, \$1.7 million for someone with a bachelor's degree, and \$2.4 million for a graduate or professional degree.
- Under the reform, high school students will be able to obtain vocational certificates, allowing for smoother entry into skilled trades;
- Higher educational levels inversely correlate with the need for public services and criminal behavior, reducing costs of public assistance (e.g., Medicaid, food stamps, TANF) and incarceration; and
- Broader availability of pre-K would free more parents to expeditiously return to the labor market.

Here are some key analytical findings, most of which are also summarized in Exhibit ES-1:

- Under the status quo, a representative cohort of Maryland public school students (about 69,000 students) arriving in ninth grade could be expected to pay \$8.9 billion in State and local taxes over a lifetime. Given improved educational outcomes and attainment, this same group would pay an estimated \$12.5 billion State and local taxes;
- Differences in outcomes are even starker when one considers various forms of social assistance. Today, a representative cohort of students would be associated with \$5.7 billion in Maryland State and local tax payments in excess of receipts from social assistance. With the anticipated results of reform, this same group would be associated with \$10.2 billion in total State and local taxes in excess of social assistance;
- By FY2033, State and local authorities will have cumulatively invested \$25.8 billion more in public education than they will have received in offsetting revenues through expanded earnings and higher labor participation. That fiscal year represents the peak of educational expenditure over countervailing revenue;
- Annual fiscal benefits first exceed the annual costs of Commission recommendations as early as FY2034;
- By FY2038, the level of annual net fiscal benefit to State and local governments peaks;
- By FY2046, Maryland will have more than fully recovered its investment in public education reform.

Exhibit ES-1. Estimated Net Costs and Fiscal Benefits of Implementing the Commission Recommendations (Millions \$2020)

Year	Costs	Prekindergarten workforce fiscal benefits	Better school outcome fiscal benefits	Annual net cost	Cumulative net cost
FY 2020	\$480	\$0	\$0	\$480	\$480
FY 2021	\$1,499	\$15	\$0	\$1,484	\$1,964
FY 2022	\$2,684	\$21	\$102	\$2,560	\$4,524
FY 2023	\$3,079	\$27	\$205	\$2,847	\$7,371
FY 2024	\$3,194	\$32	\$307	\$2,855	\$10,226
FY 2025	\$3,234	\$48	\$410	\$2,776	\$13,001
FY 2026	\$3,323	\$53	\$746	\$2,524	\$15,526
FY 2027	\$3,401	\$57	\$1,082	\$2,262	\$17,788
FY 2028	\$3,516	\$61	\$1,419	\$2,036	\$19,824
FY 2029	\$3,644	\$65	\$1,755	\$1,825	\$21,649
FY 2030	\$3,832	\$68	\$2,091	\$1,673	\$23,322
FY 2031	\$3,832	\$68	\$2,520	\$1,244	\$24,566
FY 2032	\$3,832	\$68	\$2,948	\$816	\$25,382
FY 2033	\$3,832	\$68	\$3,377	\$387	\$25,769
FY 2034	\$3,832	\$68	\$3,805	(\$41)	\$25,727
FY 2035	\$3,832	\$68	\$4,441	(\$677)	\$25,050
FY 2036	\$3,832	\$68	\$5,077	(\$1,313)	\$23,737
FY 2037	\$3,832	\$68	\$5,713	(\$1,949)	\$21,787
FY 2038	\$3,832	\$68	\$6,349	(\$2,585)	\$19,202
FY 2039	\$3,832	\$68	\$6,349	(\$2,585)	\$16,617
FY 2040	\$3,832	\$68	\$6,349	(\$2,585)	\$14,031
FY 2041	\$3,832	\$68	\$6,349	(\$2,585)	\$11,446
FY 2042	\$3,832	\$68	\$6,349	(\$2,585)	\$8,861
FY 2043	\$3,832	\$68	\$6,349	(\$2,585)	\$6,276
FY 2044	\$3,832	\$68	\$6,349	(\$2,585)	\$3,690
FY 2045	\$3,832	\$68	\$6,349	(\$2,585)	\$1,105
FY 2046	\$3,832	\$68	\$6,349	(\$2,585)	(\$1,480)
FY 2047	\$3,832	\$68	\$6,349	(\$2,585)	(\$4,066)
FY 2048	\$3,832	\$68	\$6,349	(\$2,585)	(\$6,651)
FY 2049	\$3,832	\$68	\$6,349	(\$2,585)	(\$9,236)
FY 2050	\$3,832	\$68	\$6,349	(\$2,585)	(\$11,822)

➤ *Maryland's Educational Status Quo is Not Working*

Lackluster Economic Performance Accompanies . . .

Whatever one believes about the Kirwan Commission and its recommendations, it is clear that Maryland needs to shift away from its status quo. A bit more than a quarter century ago, the Massachusetts Education Reform Act of 1993 took effect. The Act mandated sweeping changes to public education in the Commonwealth. Like proposals for educational reform in Maryland, there was a hefty price-tag in the billions of dollars.

Perhaps counterintuitively, at the vanguard of developing and insisting upon the Massachusetts' reforms was a group of business leaders. The Commonwealth's reforms are largely credited to the Massachusetts Business Alliance of Education (MBAE). These business leaders embraced the view that for Massachusetts' economy to flourish, public education needed to improve dramatically.

When the movement to reform public education in Massachusetts took hold, Maryland and Massachusetts were home to economies that were roughly equivalent in terms of performance. For instance, in 1993, Massachusetts boasted the 5th highest per capita personal income of any state and Maryland ranked 6th. At that time, annual per capita personal income in Massachusetts was less than \$250 greater than in Maryland. By 2018, this gap had widened to more than \$8,300. Rather than sink the Massachusetts economy, educational reform has been associated with a Massachusetts miracle, one that has been associated with a massive boom in innovation in and around Boston and the rejuvenation of New England's largest city.

Exhibit ES-2: Personal Income & GDP per Capita, 1993 & 2018, MD v. MA

Personal Income per Capita					
	1993	2018	% Change	1993 Rank	2018 Rank
Maryland	\$25,239	\$63,354	151%	6	7
Massachusetts	\$25,471	\$71,683	181%	5	3

Source: U.S. Census Bureau, Sage

... Unacceptable Educational Outcomes

According to the U.S. Census Bureau, Maryland is home to the 4th highest proportion of persons aged 25+ with a bachelor's degree and 3rd highest proportion of persons aged 25+ with an advanced degree among the 50 states and the District of Columbia. But while the parents are highly educated by global standards, the State's children achieve only mediocre academic results and outcomes are deteriorating.

In 2019, only 39 percent of Maryland's 4th graders were deemed proficient or better at mathematics according to the National Assessment of Education Progress (NAEP). That was 1 percentage point below the nation and placed Maryland in a six-way tie for 29th among U.S. states & D.C. In 2013, 47 percent of Maryland's 4th graders were at or better than proficient in mathematics, 6 percentage points above the national average and 17th among all states. From 2013 to 2019, Maryland's 4th graders fell from the nation's 2nd best reading scores, with student proficiency 9 percentage points above the national average to tied for 24th with scores roughly equal to the nation's. In 8th grade, Maryland's reading scores fell from tied for 3rd to 17th.

Maryland's student outcomes are mediocre in a nation that itself is subpar along the dimension of educational outcomes. Nearly half of U.S. millennials achieved below the minimum literacy skill level necessary to succeed in the 21st century and American students continue to falter on tests administered internationally.

In short, Maryland is rapidly backtracking in both absolute and relative terms on both national and international bases. By contrast, Massachusetts' 4th and 8th graders have scored first or second place on NAEP tests in 4th and 8th grade reading and mathematics since 2005 and are competitive with students from anywhere in the world.

Educational reform has the potential to place Maryland's economy on a different trajectory. That would be most welcome given the lack of dynamism in Maryland's economy relative to a number of peer group states and the utterly discouraging educational outcomes attached to the state's public-school students and graduates.

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Introduction

Strong Schools Maryland commissioned Sage Policy Group (Sage) to assess the economic and fiscal implications of recommendations promulgated by the Maryland Commission on Innovation & Excellence in Education. The Commission is better known as the Kirwan Commission, named after its chairman William E. Kirwan, who served as Chancellor of the University System of Maryland from 2002-2015.

➤ *Analytical Approach*

This report embodies the study team's efforts to translate projected educational outcomes into economic and fiscal ones. The essential task which Sage has undertaken in this project is the translation of the potential effects and impacts of the Commission's recommendations into monetary values. This has been done in part to help legislators understand the impacts of Kirwan Commission implementation on State of Maryland and local government revenues. Much has been made of the proposed costs of implementation, but little has been offered to date regarding countervailing revenues.

Importantly, the analysis takes as given the various findings and conclusions of the Commission regarding projected educational outcomes. As a prime example, the Commission estimated the costs of implementing its recommendations. Sage has not endeavored to separately estimate the cost of proposed investments/expenditures. Again, this is above all an effort at translating educational outcomes into economic ones. While our review of data regarding student achievement indicates that something is terribly amiss in public education in Maryland, it is not the objective of this report to advocate for any specific type of reform, including recommendations emerging from the Kirwan Commission.

The analysis embraces a comprehensive view of the relationships between education, earnings, household spending power, and the cost of delivering public services. The correlation between greater educational attainment and bolstered earnings is well established. Less well understood is the correlation between educational attainment and increases or decreases in demand for a host of public services, including public assistance.

While some research is available to guide estimates of these reduced demands, it is difficult to measure the full extent of the relationship between education and these public costs. For example, as discussed below, the population of state prisoners is disproportionately comprised of individuals who failed to graduate from high school. Relatively few college graduates end up in state prisons.

Accordingly, reducing the number of high school dropouts will presumably reduce the costs of incarceration in state prisons. Fewer state prisoners is almost certainly likely to correlate with reduced demand for services throughout the criminal justice system for jails, prosecutors and public defenders, court time, and public safety services. Measuring these other effects of better educational outcomes represents the essence of this analysis.

The literature is replete with analyses regarding the effects of educational attainment on earnings and public services and on the effectiveness of reforms and intervention in improving educational outcomes. This in turn can generate significant effects on economic and social conditions.

An especially useful example of such an analysis is an assessment of the costs and benefits of public schools in Colorado, which also adopts a holistic view of the relationships between educational attainment and socioeconomic conditions. The report also highlights the potential for productive interventions that help elevate educational attainment.¹ Sage found the Colorado report to be useful in terms of supplying a logical analytical framework.

Also instructive is the comprehensive reform undertaken by Massachusetts starting a bit more than a quarter-century ago, as well as the commitment of Washington D.C. to widespread access to pre-kindergarten.

Much of Sage's work analyzes the correlation between levels of education and economic, fiscal, and public service impacts at the level of the individual. Summing predicted impacts across individuals supplies a sense of how implementation of Kirwan Commission recommendations would alter the size and structure of Maryland's economy if predicted educational outcomes come to pass, potentially producing a larger tax base while simultaneously diminishing the demand for certain government services. However, such an approach may ultimately underestimate socioeconomic impacts since there are likely to be altered interactions between individuals, including positive role model effects that are difficult to measure and predict.

¹ Belfield, Clive R., and H. M. Levine. "The Fiscal and Social Burden of Inadequate Education in Colorado." 2011.

I. The Commission on Innovation & Excellence in Education

Created by Maryland's legislature in 2016, the Commission on Innovation & Excellence in Education is charged with generating recommendations for improving public education in Maryland. Those improvements are intended to help Maryland public-school students meet the challenges of a continuously shifting global economy, respond to the needs of Maryland's evolving labor force requirements, and be better prepared for post-secondary education if that is a preferred option for the individual.

In other words, Commission recommendations are intended to help students succeed in college and careers whatever their preferences and proclivities. This includes offering opportunities to pursue career technical education and accompanying vocational certificates as an alternative to college. In the context of broadly crafted directives, the Commission developed policies, associated implementation strategies, and funding formulas designed to create a world-class public-school system in the service of all Maryland public-school students.²

The Commission includes many of Maryland's leading citizens, including educational leaders from across the state, members of the state legislature, and a prominent corporate CEO. Chaired by William Kirwan, Chancellor Emeritus of the University System of Maryland, the Commission is popularly known as the Kirwan Commission.

The Commission has been interested in more than positioning Maryland as a leading system within the United States. The Commission endeavors to position Maryland at the highest tier globally. Accordingly, the Commission has analyzed top-performing school systems across the U.S. along with educational structures in Ontario (Canada), Finland, Singapore, and Shanghai (China) demonstrating excellence in education.

² Much of the discussion of the origins and work of the Commission is derived from the Maryland Commission on Innovation & Excellence in Education, "Interim Report," January 2019. Other materials created for the Commission were instrumental, particularly, National Center on Education and the Economy, "How Does Maryland Stack Up? A Gap Analysis Comparing Maryland to International and Domestic Top Performers," 2018.

➤ *The Current State of Maryland's Public-schools*

By examining the results of testing protocols that are utilized across the United States, the Commission determined that despite some productive innovations at individual schools and instances of effective leadership, the entire Maryland public-schools system has been performing near the middle of the pack of all states in reading and math. The National Assessment of Educational Progress assesses learning outcomes for fourth and eighth graders in the U.S. every two years. Not only were these scores in the middle ranks for all states, but Maryland was also the only state where the scores declined from 2013-2015.

This lackluster record relative to other states does not improve when the context is broadened to encompass students from around the world. The Program for International Student Assessment routinely measures 15-year-old student learning in math, reading, and science in dozens of nations. As the Commission reported, in a recent round of testing, American students performed at just above the median level for students in 72 countries.

In short, the Commission reached the conclusion that Maryland public-school students have been performing at a mediocre level relative to their American peers. American students, in turn, have been performing at a mediocre level relative to their peers around the globe. This underperformance was determined to be widespread, affecting at least some schools in each of Maryland's 24 school districts.

Problems extend well beyond the performance of students. The Commission identified major shortages of teachers, especially for science and mathematics. More than half of new teachers have been recruited from beyond Maryland. Based on several national studies, the Commission concluded that school funding in the state is regressive; i.e., unfair to poor communities and their students.

➤ *Gaps in Maryland's Public-school System*

With support supplied by the National Center on Education and the Economy (NCEE), the Commission analyzed gaps in Maryland's educational policies and practices in comparison to four well-respected and high-performing international school systems—Finland, Ontario (Canada), Shanghai (China), and Singapore—and in comparison to systems in New Jersey, New Hampshire, and Massachusetts.³ This gap analysis examined a series of “building blocks” that NCEE finds to be essential to creating high-performing schools that produce world-class student outcomes.

- Strong supports for children and their families before students arrive at school;
- More resources for at-risk students;
- Instructional systems and gateways;
- Abundant supplies of highly qualified teachers with the necessary dispositions, knowledge, and skills;
- Schools that treat teachers as professionals with incentives and support for continuous improvement;
- Effective systems of career and technical education and training;
- Leadership development systems to develop leaders at all levels; and
- Governance system to develop powerful policies and implement them at scale, holding the state, school districts and schools accountable for faithful implementation and outcomes.

The gap analysis supplies numerous recommendations designed to help Maryland create a world-class public-school system. Salient observations garnered from the gap analysis are discussed in the paragraphs that follow.

Critically, in many other nations, support for children and families before students arrive at school includes maternal and child health services, parental education, paid parental leave, and other services that are often difficult to access in the United States. High quality childcare is another valued support that is available in the U.S., but at costs often higher than those in benchmark countries. Recommendations for Maryland include expanding the reach and scope of support services for children ages 0 to 3 years and their families, making childcare for working families affordable, enhancing the professionalism of early childhood educators, and expanding enrollment in quality pre-kindergarten programs.

³ National Center on Education and the Economy, “How Does Maryland Stack Up? A Gap Analysis Comparing Maryland to International and Domestic Top Performers,” 2018.

The gap analysis notes that high-performing international systems fund education more equitably than any U.S. state. For example, extra teachers in these systems are assigned to work with high-needs students on a continuous basis. Recommendations for Maryland are to supply those required resources to at-risk students and to distribute funding and resources in a manner that reduces the gap between the lowest performing quartile of students and the highest performing.

A common theme in high-performing school systems around the world is highly qualified teachers. Accordingly, recommendations for Maryland include sourcing teachers from the top of high school graduating classes, considering requiring elementary school teachers to specialize in either mathematics/science or the humanities, developing career ladders for teachers and school leaders, and creating incentives for top-tier students to study to become teachers.

The gap analysis draws parallels between teaching as a profession and (other) high-status professions associated with similar training requirements and responsibilities. The analysis recommends narrowing the gap in compensation between teaching and these other professions and enriching professional development opportunities for teachers to supply ongoing opportunities for teachers to improve skills and qualifications.

Career and technical education is a hallmark of the international top-performing school systems. These systems often enroll 40 percent or more of high school students in career and technical education programs. These programs are viewed as gateways to both employment and post-secondary education that supports that employment.

Industries involved in either fashioning these programs or employing their graduates cover a broad-spectrum including banking, healthcare, and high-tech manufacturing. An effective career and technical education program in Maryland would overcome the impression that such programs are often for students who struggle academically. Instead, the policy objective is to frame these programs as providing more applied forms of education for those who want to start careers immediately following high school graduation. Accordingly, the Commission recommended modernizing current career and technical education program offerings so that programs of study result in recognized industry certifications for jobs in high-skill, high-wage areas.

The gap analysis also examines how to maintain excellence in school systems. In this context, the quality of school leadership is critical. Recommendations for Maryland include an effective system for identifying and developing those who would be effective principals able to manage professionals.

Among other things, the Commission's report recommends investments in teachers with leadership potential and providing a career ladder that channels and nurtures that potential. Another set of recommendations focuses on the creation of governance structures that produce the plans, policies, and procedures that would build in accountability, quality assurance, and continuous improvement.

➤ *Recommendations to Create a World-Class Public-school System*

In its January 2019 report, the Commission organizes recommendations into five broad categories. These recommendations supply significant detail regarding policies, practices, and procedures that Maryland should undertake to create a world-class public-school system. The following discussion highlights key elements of these recommendations.

Policy Area 1 addresses early childhood education. The focus of this group of recommendations is the creation of pre-kindergarten programs for three-year-olds and four-year-olds across Maryland. These programs would be free for the lowest income families and be available on a sliding scale for more affluent families. When fully implemented in 2030, these pre-kindergarten programs would serve more than 80,000 children in Maryland.

To provide additional support for low-income families, the Commission proposes significant expansions of Family Support Centers and Judy Centers. These facilities coordinate the delivery of a wide array of health and social services to families with children. In some instances, agencies or organizations providing those services are also located within the centers so that barriers to receiving services are minimized. The Commission further proposes expanding a program for Maryland infants and toddlers who have been identified as exhibiting delayed development.

The intent of these recommendations is to better prepare young Marylanders for school and learning. As demonstrated by top-performing school systems around the world, these early interventions represent cost-effective methods for resolving learning issues early and tend to reduce the need for more expensive remediation later in students' educational careers.

Policy Area 2 focuses on high quality and diverse teachers and leaders. This recommendation includes more rigorous teacher preparation programs and higher standards for licensing new teachers in Maryland.

Incentives (e.g., scholarship and loan assistance for students in teacher preparation programs) are recommended so that highly skilled and diverse teachers can be placed in high-need schools. Several recommendations seek to raise the overall status of teaching so that prospective teachers can be drawn from a diverse and highly qualified pool of candidates.

The Commission recommends that compensation for teachers should be aligned with other high-status occupations with similar stringent training and educational requirements. Another aspect of this policy area is the creation of career ladders that encourage professional development and provide incentives for teachers and school leaders to improve credentials and performance.

Policy Area 3 addresses college and career readiness, including through the provision of career and technical education. Any career and college readiness standard should be consistent with global standards that assure the necessary English and mathematics skills to succeed in postsecondary Maryland institutions.

An element of this set of recommendations is to provide supplemental instruction to kindergarten through third grade students who are struggling learners. This represents a kind of early warning system designed to resolve learning issues as early as possible and avoid later, more difficult and expensive remediation.

Similarly, the Commission calls for alternative approaches for older students who are unlikely to meet college and career readiness standards by the end of the 10th grade. For students who meet college and career readiness standards, recommendation would require local school systems to provide robust academic and career pathways during the final years of high school.

Another aspect of this recommendation is the creation of a committee comprising state agency, community college, and industry leaders charged with creating a world-class career and technical education (CTE) system for Maryland. The CTE program would be developed in concert with Maryland economic development, workforce development, and relevant agencies so that it can support the evolving and emerging industries of the 21st century.

Policy Area 4 is concerned with closing gaps between the highest performing schools and those that struggle. Related recommendations include policies and procedures to provide appropriate levels of funding to schools with concentrated poverty. All school staff would be trained to identify students' mental health and related problems and make appropriate referrals to service providers. Other recommendations address funding issues related to special education to achieve greater parity as well as funding for English learner students and for compensatory education.

Policy Area 5 recommends establishing an Independent Oversight Board with staff capacity to assure that Commission recommendations are faithfully implemented and that the desired effects and results are achieved. This Board would be authorized to develop a comprehensive implementation plan that would engage a wide range of educational and other institutions in implementation and hold all responsible and accountable for their participation. Further, the Board would be vested with the responsibility and authority to send support teams to districts and schools that are struggling and, in the final analysis, to withhold funds from districts or schools that resist or otherwise fail to implement the Commission recommendations. Finally, the Board will have the responsibility to report to the General Assembly and the Governor on a regular basis and recommend mid-course corrections that may be required based on experience.

Associated recommendations also charge the state education department with monitoring student progress and identifying areas of inadequate performance. A Career Technical Education Committee would be charged with the oversight of that program and its successful collaboration with the state's community colleges and other workforce development programs (e.g., apprenticeships). Similarly, governance and accountability would be concerned with teacher preparation programs and their ability to upgrade the profession.

II. The Role of Education and Human Capital in a Knowledge-Based Economy

The term knowledge-based economy refers to trends in the world's advanced economies towards a greater dependence on knowledge, information, and high-skill levels to produce value and economic growth. In the transition from an agrarian economy to an industrial economy to a knowledge-based economy, the value of human capital as a factor in economic productivity and growth has become increasingly important. Human capital can be defined as the cognitive skills that are increasingly critical to success in a knowledge-based economy, particularly literacy and numeracy.

These trends towards a dependence on knowledge, information, and human capital have placed greater emphasis on post-secondary educational attainment. From 1970 to 2017, the percentage of adult Marylanders with a college degree increased from 14 percent to 40 percent. Alternatively, during that same period, the share of adult Marylanders who did not complete high school fell from 48 percent to 10 percent. (See Exhibit A-1 in Appendix.) As discussed elsewhere in this report, higher levels of education are routinely associated with higher earnings and more active participation in the labor force.

The growing share of Marylanders with college degrees is in large measure a function of well-educated individuals moving to Maryland as opposed to Maryland public-schools creating well-educated residents. As discussed below, about one-quarter of current Maryland public-school students go on to earn four-year or advanced degrees. Thus, to achieve its status as a highly educated state, Maryland must import well-educated residents.

This disparity between the ultimate educational attainment of Maryland public-school students and the educational attainment of Maryland residents is further complicated by recent National Assessment of Educational Progress (NAEP) scores. This biennial survey of fourth and eighth grade students across the nation indicated declines in 2019 proficiency scores from 2017 in reading for fourth graders (from 40 percent in 2017 to 35 percent in 2019) and eighth graders (from 38 percent in 2017 to 36 percent in 2019).

Proficiency scores in math were somewhat better, declining from 42 percent in 2017 to 39 percent in 2019 for fourth graders and holding steady at 33 percent for eighth graders in both years. Since the economy demands better educated and more proficient workers, the ability of Maryland public-schools to produce students who are proficient in reading and math is problematic. The State of Maryland is in the process of creating many members of a lost generation—a generation that will have little opportunity to improve upon the living standards of their parents—a generation that may come to be highly dependent on public assistance.

Neighboring Washington, D.C. countered the national pattern of declining scores with proficiency scores in reading and math that increased in three of four categories for fourth and eighth graders.⁴ Notably, Washington, DC implemented universal pre-kindergarten for three- and four-year-olds in 2009. Kirwan Commission recommendations embody that policy initiative.

The relationship between the knowledge-based economy and post-secondary education is complex. While there is a clear link between four-year and advanced degrees and the knowledge-based economy, it is possible to earn relatively high salaries without a four-year college degree. Several recent articles highlight high-paying jobs that are available without a four-year degree. These jobs, however, demand substantial human capital; that is, the literacy and numeracy that allow for the completion of routine work tasks and the acquisition of new knowledge as work evolves. These high-skill levels typically require postsecondary training, apprenticeships, or other vocational training leading to vocational certificates, exam-based licenses, or other documentation of acquired skills.⁵

While earning a good salary without a four-year or advanced college degree is possible, overall trends for economic success have clearly favored those with higher educational attainment. Since 1980, the economic rewards for those with at least four-year college degrees have been significant, particularly for those with advanced degrees. Conversely, those who have failed to achieve four-year college degrees have experienced significant reductions in real wages. As noted in Exhibit 1, those whose education stopped with a high school diploma have witnessed a 13 percent drop in real wages while those failing to complete high school have seen a 20 percent drop. Even those with some college have experienced a 12 percent reduction in real wages.⁶

These trends in real wages have contributed to greater inequality between those with four-year or advanced degrees and those with less educational attainment. In 1980, someone with a Bachelor's degree earned about one-third more than someone with a high school diploma, while someone with an advanced degree earned over 50 percent more.

⁴ Richman, Talia, "Frankly, devastating?: Maryland reading scores decline on national assessment," The Baltimore Sun, October 30, 2019 <https://www.baltimoresun.com/education/bs-md-naep-score-release-20191030-vyfuhrsfg5egvice35g42e2fxq-story.html>

⁵ Examples of this recent media coverage include Renzulli, Kerri Anne, "The 10 highest-paying jobs you can get without a college degree all pay more than \$79,000," April 24, 2019 <https://www.cnbc.com/2019/04/24/the-10-highest-paying-jobs-you-can-get-without-a-college-degree.html> and Suneson, Grant, "Almost \$100K per year: Highest-paying jobs you can get without a college degree," July 21, 2019. <https://www.usatoday.com/story/money/careers/2019/07/21/highest-paying-jobs-you-can-get-without-a-college-degree/39701321/>.

⁶ Congressional Research Service, "Real Wage Trends, 1979 to 2018," updated July 23, 2019 <https://fas.org/sgp/crs/misc/R45090.pdf>.

Exhibit 1. Median Hourly Wage by Educational Attainment, 1980 – 2018
(2018 Dollars)

	1980	2018	% Change
Advanced degree	\$29.66	\$36.71	23.8%
Bachelor's degree	\$25.95	\$28.37	9.3%
Some college	\$22.46	\$19.80	-11.8%
HS diploma	\$19.51	\$17.00	-12.9%
Less than HS diploma	\$16.88	\$13.50	-20.0%

Source. Congressional Research Service

By 2018, an individual with a bachelor's degree earned two-thirds more than someone with a high school diploma, while someone with an advanced degree earned more than twice that of an individual with a high school diploma as the highest form of their educational attainment. Relative earnings of those with some college barely changed in comparison to someone with a high school diploma. Earnings for those who fail to finish high school fell further behind those who completed high school.

Exhibit 2. Earnings by Educational Attainment as a Percentage of Earnings of a High School Graduate

	1980	2018
Advanced degree	152%	216%
Bachelor's degree	133%	167%
Some college	115%	116%
HS diploma	100%	100%
Less than HS diploma	87%	79%

Source. Congressional Research Service

Given these trends, it is unsurprising that in recent years new jobs have gone to those with four-year college degrees while the opportunities for those who have only a high school diploma or who have failed to finish high school have decreased. Since the apex of the Great Recession in 2008, virtually all new jobs—roughly 12 million—have been statistically filled by those with at least Bachelor's degrees. Approximately 2 million jobs have been filled by those with some college. There has been a net loss of almost 5 million jobs held by those with no more than a high school diploma.⁷

This trend towards a more educated workforce shows no indications of relenting. Georgetown University's Center on Education and the Workforce has studied changes in the economy and the

⁷ Goldstein, Steve, "Nine out of 10 new jobs are going to those with a college degree," June 5, 2018. <https://www.marketwatch.com/story/nine-out-of-10-new-jobs-are-going-to-those-with-a-college-degree-2018-06-04>.

demands of employers for years. The Center examined the educational requirements of future jobs and the ability of the nation and each state to meet those demands.⁸

A Center analysis determined that 65 percent of the nation's jobs will require post-secondary education by 2020. In Maryland, the share of jobs requiring postsecondary education is higher, 69 percent.

Exhibit 3 compares the share of these future jobs that will require post-secondary education with the outcomes of current Maryland public-school students and the current Maryland adult population. The outcomes of current Maryland public-school students fall significantly below these projected educational needs.⁹ As the Commission found, fewer than 40 percent of current Maryland public-school students are college and career ready as defined by proficiency in English and math. Given the most recent NAEP scores, the percentage of Maryland public-school students who are prepared to be successful in earning four-year and advanced degrees is likely declining.

Alternatively, current Maryland adults also fall somewhat short, but not nearly by the margins of current Maryland public-school students.¹⁰ The gap between the educational attainment of current Maryland adults and the predicted outcomes of current Maryland public-school students strongly suggests that Maryland has met, and is likely to continue to meet, its needs for human capital by importing substantial human capital from outside the state. This has been a hallmark of Maryland for decades as top jobs at private enterprises, research labs, universities, medical systems, and other establishments have frequently been filled by highly-educated outsiders even as many communities within the state have stagnated economically and many Marylanders have lacked a firm foothold in the 21st century economy.

Exhibit 3. Share of Jobs by 2020 that will Require Postsecondary Education by Specific Level Versus Current Public-school Outcomes and Adult Residents

	Some college, Associate's degree, or postsecondary vocational certificate	Bachelor's degree	Master's degree or better
Maryland by 2020	29%	23%	16%
Current Maryland public-school outcomes	40%	16%	9%
Current Maryland adult residents	26%	21%	18%

Sources. Center on Education and the Workforce, National Center on Education and the Economy, U.S. Census Bureau

⁸ Center on Education and the Workforce, "recovery: Projections of Jobs and Education Requirements Through 2020," June 2013. https://cew.georgetown.edu/wp-content/uploads/StateProjections_6.1.15_agc_v2.pdf.

⁹ National Center on Education and the Economy, "How Does Maryland Stacked Up?" January 2018

¹⁰ U.S. Census Bureau, American Fact Finder.

- **A Disconnect Between Educational Attainment and Human Capital**

Educational attainment has been a ready proxy measure for the acquisition of the human capital required for a knowledge-based economy. Recent research, however, indicates that educational attainment is an imperfect measure of the acquisition of key competencies needed to thrive in a modern economy.

A recent study by researchers at the Center for Research on Human Capital and Education at the Educational Testing Service (ETS) examined results of international testing for literacy, numeracy, and other competencies.¹¹ The Organization for Economic Cooperation and Development (OECD) has surveyed the skills of adults in 33 advanced economies using the Programme for International Assessment of Adult Competencies (PIAAC). This survey analyzes competencies in literacy, numeracy, and more complex technological capacities on a five-point scale where a score of 1 represents low levels of literacy and numeracy and a score of 5 represents high levels of skill.

Because PIAAC surveys adults ages 16 to 65, researchers can analyze changes in competencies over time. Older adults in the United States, for example, outperformed their counterparts in many other advanced economies.

With the advent of the knowledge-based economy, many countries have invested substantially in education and other social support systems with the goal of improving the human capital of their younger citizens. These investments are reflected in the PIAAC results for millennials, those aged 16 to 34 years. The results are striking for millennials in the United States. Despite being associated with the highest levels of educational attainment in American history, millennials fared poorly against their counterparts in other advanced economies.

The average score for millennials in the United States in literacy (277 out of 500) was equal to the average for all countries surveyed. This score was well below the top scoring countries, Japan and Finland, which each scored in excess of 300. Almost half of U.S. millennials—more than 35 million individuals—achieved scores below Level 3, which is considered the *minimum* skill level to succeed in the 21st century economy.

In numeracy, America's score (261 out of 500) was below average for all surveyed countries (271 out of 500) and significantly better than only four nations. Three out of five American millennials—

¹¹ The discussion of PIAAC scores and their correlation with economic and social conditions is based on Sands, Anita and Madeline Goodman, "Too Big To Fail: Millennial's on the Margins," ETS Center for Research on Human Capital and Education, April 2018.

translating into more than 46 million individuals—scored below Level 3 in numeracy. In short, even as America has become more educated, it has fallen behind many other nations in terms of the mastery of basic skills among members of the emerging workforce.

These results can be disaggregated by race and ethnicity as well as by proficiency in English. Blacks and Hispanics, which constitute one-third of all U.S. millennials, fare worse in literacy and much worse in numeracy. In literacy, the shares of Blacks and Hispanics scoring at or above Level 3 (29 percent and 33 percent, respectively) were roughly half of the share of Whites and other races (64 percent and 56 percent, respectively). In numeracy, the shares of Blacks and Hispanics scoring at or above Level 3 (13 percent and 21 percent, respectively) were well below half of the share of Whites and other races (52 percent and 47 percent, respectively) performing at that level. Results were similar for those for whom English is not a native language.

The disparity between American millennials' historically high levels of educational attainment and the performance of this generation against their peers in other countries is also observable in the skills levels of well-educated American millennials. As noted above, a score of Level 3 on PIAAC is considered the minimum level of proficiency for acquiring the skills needed for the 21st century economy. For American millennials who were enrolled in an educational institution at the time of the survey and had earned a two-year college degree or higher, 22 percent scored below Level 3 in literacy and 37 percent scored below Level 3 in numeracy. For millennials who were not enrolled in an educational institution and had earned two-year degrees or higher, results were similar; 21 percent scored below Level 3 in literacy while 32 percent scored below Level 3 in numeracy.

Thus, for American millennials with college degrees, one in five had failed to acquire minimum literacy skills and one in three failed to achieve minimum numeracy skills. For millennials with some college but no degree, only a high school diploma, or without a high school diploma, results are worse and become increasingly problematic as educational attainment declines.

The inter-connectedness between human capital and the economy is well established. Greater human capital (i.e. greater proficiency in literacy, numeracy, and related skills) is correlated with higher earnings.

Differences in skill levels also tend to increase over time. Higher skill levels are prioritized by businesses when choosing to train workers to advance their careers. Conversely, workers with low skills may not have the literacy or numeracy to improve their employment opportunities.

Impacts of human capital extend beyond purely economic matters. Research has established that low skill levels correlate with reduced enrollment in health insurance as well as lower levels of trust, volunteerism, and civic engagement.

- **Maryland's Report Card**

As the Kirwan Commission notes in its report, Maryland public-school students generally perform at the average level for all U.S. public-school students. According to the Maryland Report Card, the 2017 NAEP scores for Maryland eighth grade students rated 38 percent proficient or advanced in reading versus 35 percent for all U.S. students. For mathematics, there were similar results — 33 percent of Maryland eighth graders were rated as proficient or advanced versus 34 percent for all U.S. students. The fact that the 2019 NAEP reading scores for Maryland fourth and eighth graders were lower in 2019 than in 2017 reinforces the status of Maryland as performing about as well as the national average. As is true with PIAAC scores, results for Maryland Black and Hispanic students were substantially below those of Whites and Asian/Pacific Islanders.

These patterns persist into high school. In 2019, only 42.6 percent of Maryland public-school students were proficient in English 10 while 27.2 percent were proficient in Algebra I.¹²

These conditions suggest that like U.S. millennials, Maryland public-school students are not well prepared to thrive in a 21st century economy. With literacy and numeracy competencies that are average at best, Maryland public-school students may struggle to maintain themselves in an economy that not only relies on knowledge, but is also increasingly characterized by change and winner-take-all dynamics. Some of the most successful American companies have succeeded by disrupting the status quo (e.g., Apple, Tesla, Amazon, Microsoft, Google, Facebook, Netflix, Lyft). These are the winners. Adapting to change requires a significant proficiency in literacy and numeracy. A lack of adaptability results in lower earnings, less stable income, and other unfortunate outcomes.

In light of these realities, the Commission has a stated goal of raising the proficiencies of Maryland public-school students in English 10 and Algebra I to 80 percent.¹³ This goal would roughly double the current proficiency achievements of Maryland public-school students and would raise the abilities of Maryland students to the levels of the best-performing countries in the world. This goal is designed to render Maryland public-school students college and career ready. Data from the

¹² Maryland State Department of Education, "Maryland Report Card"
<https://reportcard.msde.maryland.gov/Graphs/#/Assessments/NAEPResults/2MA/8/99/XXXX>.

¹³ Op. cit., Maryland Commission on Innovation & Excellence in Education.

PIAAC survey strongly suggests that proficiencies at that level would well prepare students for the postsecondary education and opportunities that are characteristic of a highly functioning economy.

Conversely, PIAAC survey results indicate that current outcomes for Maryland public-school students will hamper their ability to function in today's economy. This inability will also be a likely drag on the state's economy and continue or increase the need for Maryland to import human capital to meet the needs of the state's economy. While there is of course nothing wrong with welcoming outsiders, the ability to recruit from elsewhere does not absolve Maryland (and its 24 school districts) from the responsibility of teaching and training its own citizens.

Research also indicates that there is a compounding effect at both ends of the proficiency spectrum. High-performing, highly skilled individuals tend to work hard to assure that their offspring also acquire high skills and the human capital needed to thrive in the 21st century. Alternatively, those with low skills are often unable to enhance the human capital of their offspring (though there are noteworthy exceptions). One consequence of these compounding tendencies is increasing inequality over the course of generations.¹⁴

¹⁴ Op. cit. Sands, Anita and Madeline Goodman.

III. The Current Status of Outcomes for Maryland Public-school Students

To understand the potential impacts of Commission recommendations, it is important to understand the current status of public-school students in Maryland and the economic and social implications of the status quo. The following discussion examines educational outcomes for a group of students who entered public high school in Maryland in 2010.

➤ *Educational Outcomes for Students Entering High School In 2010*

The starting point for looking at the economic and social implications of Maryland public-school students is reviewing educational outcomes. The cohort of students entering high school in 2010 would typically have completed high school in 2014. Upon graduation, some portion of these students would continue on to college where they may or may not earn a degree.

As illustrated in Exhibit 4, 87 percent of students entering high school in 2010 proceeded to graduate from high school in 2014, while 13 percent did not earn a high school diploma in 2014. Along with a high school diploma, 9 percent of this cohort of students earned a vocational certificate in 2014.

Among those who graduated from high school, a majority chose to enroll in college. Those entering college constituted 65 percent of the cohort of students entering high school in 2010.¹⁵

The Kirwan Commission determined that fewer than 40 percent of current Maryland public-school students were proficient in English and math when they graduated from high school. By these measures, fewer than 40 percent of these students were well prepared for success in college or careers, which among other things translates into the need for remedial instruction in college and an elevated tendency to leave college prior to graduation.

Exhibit 4. Initial Outcomes for Students Entering High School in 2010

Outcomes	Share of all incoming students
Did not earn HS diploma, 2014	13.0%
Earned HS diploma, 2014	87.0%
Earned vocational certificate, 2014	9.0%
Did not enter college	35.0%
Entered college	65.0%

Source. Maryland Department of Education

¹⁵ The source of data on outcomes for the cohort of students entering Maryland public high schools in 2010 is the Maryland Department of Education as reported in National Center on Education and the Economy, “How Does Maryland Stack Up?” January 2018.

For those moving on to college, undergraduate education would require nominally 2 to 4 more years (often more than that, depending on whether students chose two-year or four-year colleges and upon myriad other factors). Exhibit 5 lists the college choices of the roughly 65 percent of the students entering high school in 2010 who went on to pursue post-secondary education. Roughly 23 percent of the students who began high school in 2010 chose two-year colleges, the vast majority being public colleges. Another 17 percent of those starting high school in 2010 chose four-year colleges in Maryland, again mostly public colleges. Almost one in four students starting high school in 2010 selected a college outside of Maryland.

The exhibit also lists graduation rates after either three years for those at two-year colleges or six years for those at four-year colleges. The highest graduation rates were for those students who chose four-year private colleges in Maryland. This group is associated with a graduation rate exceeding 73 percent.

The lowest graduation rates were for students enrolling in two-year public colleges, who graduated at a rate of not quite *15 percent*. Overall, only 45 percent of students entering high school in 2010 who entered college were able to complete 2- or 4-year college programs in a timely manner. This is nothing short of an indictment regarding the quality of Maryland public education today.

Exhibit 5. College Pathways and Outcomes

College choices	Share of all 2010 incoming students	Graduated in 3 to 6 years: Share of students enrolled at these colleges
2-year public college in Maryland	22.0%	14.5%
2-year private college in Maryland	1.0%	61.3%
4-year public college in Maryland	12.0%	60.8%
4-year private college in Maryland	5.0%	73.3%
College out of Maryland	24.0%	59.0%
Totals for those enrolled in college	65.0%	45.2%

Source. Maryland Department of Education. Note. Totals may not add due to rounding.

The ultimate educational attainment for Maryland public-school students entering high school in 2010 is summarized in Exhibit 6. As indicated, 13 percent did not earn a high school diploma while 22 percent earned a high school diploma but ended their schooling at that point. Roughly 36 percent enrolled in college but did not earn a degree. Not quite 4 percent earned an Associate degree (i.e. a degree from a two-year college). Roughly one in four Maryland students entering high school in 2010 earned a Bachelor's degree. This conclusion rests on the presumption that all colleges located out of Maryland that Marylanders attended were four-year colleges.

Exhibit 6. Ultimate Educational Attainment for Cohort of Students Entering High School in 2010

Ultimate level of educational attainment	Share of all 2010 incoming students
Did not earn HS diploma	13.0%
Earned HS diploma	22.0%
Earned vocational certificate	9.0%
Some college, no degree	36.1%
Associate degree (2-year college)	3.8%
Bachelor's degree or higher	25.1%
Total	100.0%

Source. Maryland Department of Education

Many of these four-year college graduates can be expected to go on to earn an advanced degree at the Master's or Doctoral level or a degree from a professional school such as law or medicine. Nationally, about 37 percent of those with a Bachelor's degree go on to earn advanced degrees. Applying this ratio to Maryland public-school students produces an estimated 9.3 percent of students entering high school in 2010 who will ultimately earn an advanced degree.

Exhibit 7. Graduation Rates and Proficiency by Maryland School District

Jurisdiction	Enrollment, 2018	High school graduation rate				Proficient (PL 4 & 5) Performance Level	
		2018	2017	2016	2015	English 10	Algebra I
						2018	2018
Maryland	893,289	87.1%	87.7%	87.6%	87.0%	42.4%	31.2%
Allegany County	8,629	90.4%	90.9%	88.7%	90.2%	36.8%	29.8%
Anne Arundel County	82,777	89.2%	88.5%	89.1%	88.0%	49.9%	45.5%
Baltimore City	80,591	72.2%	70.7%	70.7%	69.5%	33.6%	8.8%
Baltimore County	113,282	89.2%	89.0%	89.2%	87.8%	33.7%	17.0%
Calvert County	15,908	93.9%	94.6%	94.5%	94.2%	65.5%	53.8%
Caroline County	5,787	88.7%	82.3%	89.0%	88.7%	46.0%	33.3%
Carroll County	25,290	96.0%	95.0%	95.0%	95.0%	64.7%	57.8%
Cecil County	15,364	91.3%	90.5%	90.7%	87.8%	49.3%	33.4%
Charles County	26,891	93.5%	94.7%	92.2%	92.4%	34.6%	34.8%
Dorchester County	4,767	81.7%	83.2%	86.5%	86.2%	24.4%	17.8%
Frederick County	42,140	92.5%	92.5%	92.1%	93.5%	61.6%	54.4%
Garrett County	3,811	89.9%	92.4%	91.6%	93.5%	43.1%	31.7%
Harford County	37,780	89.2%	88.9%	89.1%	89.9%	50.4%	38.7%
Howard County	56,784	92.0%	92.3%	93.2%	93.5%	60.9%	57.0%
Kent County	1,993	93.5%	90.5%	88.6%	90.8%	37.5%	17.7%
Montgomery County	161,546	88.4%	89.5%	89.8%	89.4%	56.2%	40.6%
Prince George's County	132,322	78.5%	82.7%	81.4%	78.8%	24.8%	11.9%
Queen Anne's County	7,778	96.3%	95.0%	95.0%	94.9%	61.5%	50.1%
Saint Mary's County	18,053	94.5%	93.9%	93.7%	94.3%	51.1%	45.2%
Somerset County	2,918	84.5%	86.0%	82.6%	88.0%	35.0%	21.0%
Talbot County	4,646	94.2%	87.1%	85.5%	93.3%	52.4%	29.0%
Washington County	22,595	93.1%	92.2%	91.1%	91.2%	46.6%	37.9%
Wicomico County	14,953	83.2%	83.8%	81.5%	83.5%	36.9%	23.8%
Worcester County	6,684	92.5%	91.8%	91.7%	93.1%	57.6%	46.9%

Source. Maryland Department of Education

Student outcomes in Maryland's public-schools vary across the state. Exhibit 7 supplies enrollment data and high school graduation rates in recent years for each city/county-level school district in Maryland. In 2018, high school graduation rates ranged from 72 percent in Baltimore City to 96 percent in Carroll and Queen Anne's counties.¹⁶

An important measure regarding the effectiveness of Maryland public-schools is proficiency in English and math, which can indicate readiness for either college or a gainful career. The exhibit also lists the proficiency performance levels of high school students in English 10 and Algebra I. As with high school graduation rates, proficiency results vary considerably across Maryland's 24 school districts.

By school district, English 10 proficiency ranges from 24.4 percent to 65.5 percent; Algebra I proficiency ranges from 8.8 percent to 57.8 percent. These proficiencies are for individual students and reflect massive performance gaps across systems in a geographically compact state.¹⁷ Over time, these massive gaps in proficiency will naturally tend to translate into massive disparities in prosperity.

➤ *Earnings Associated with these Educational Outcomes*

In an increasingly knowledge-based economy, education is viewed as a pathway to better jobs and greater income. This is nothing new, but there are continuous flows of data and analysis that render it abundantly clear that the connection between human capital formation and economic well-being is becoming stronger over time. The correlation between higher educational attainment and higher earnings is well documented by the U.S. Bureau of the Census and the Bureau of Labor and Statistics among others. But these are hardly the only available sources.

The Federal Reserve Board of Richmond produced a special report that tracked earnings and educational attainment in Maryland over a period of decades.¹⁸ The report calculates median earnings by educational attainment and also supplies unemployment rates and labor force participation rates by educational attainment.

Exhibit 8 presents Federal Reserve Board of Richmond data regarding educational attainment, earnings, and labor force participation in Maryland in 2017. As indicated, earnings increase with greater educational attainment. Those who do not complete high school were associated with a

¹⁶ Maryland Department of Education, "Maryland Report Card".

¹⁷ Private communication, Rachel Hilse to Sage Policy Group, October 17, 2019.

¹⁸ Federal Reserve Board of Richmond, "Educational Attainment in Maryland, 2017". https://www.richmondfed.org/-/media/richmondfedorg/research/regional_economy/reports/special_reports/pdf/educational_attainment_md.pdf.

median income of a bit more than \$26,000 in 2017, while those with a high school diploma or its equivalent earned an additional \$9,000.

Those with some college experience, but without a degree earned almost \$43,000 (or \$17,000 above non-high school graduates), while those who achieved a Bachelor's degree earned more than \$61,000 that year. Those who went on to earn either graduate or professional degrees were associated with median earnings in excess of \$82,000.

Labor force participation also increases with educational attainment. To be a member of the labor force, one must be working or actively looking for work. Among those with less than a high school diploma, 64 percent participated in the labor force. This increases steadily with educational attainment until those with college degrees were found to participate in the labor force nearly 90 percent of the time.

Predictably, as educational attainment increases, unemployment rates decrease. Those without a high school diploma experienced unemployment rates in excess of 8 percent while those with college degrees experienced unemployment rates of just greater than 2 percent.

Exhibit 8. Economic Characteristics and Educational Attainment, Maryland 2017

Educational attainment	Less than a high school diploma	High school diploma or equivalent	Some college or Associate degree	Bachelor's degree	Graduate or professional degree
Median earnings, 2017	\$26,309	\$35,409	\$42,707	\$61,640	\$82,432
Unemployment rate	8.6%	6.5%	4.4%	2.3%	2.3%
Labor force participation rate	63.8%	76.0%	82.6%	89.6%	89.6%

Source: U.S. Census Bureau

Median earnings represent the value which divides a population into two equal parts. However, average earnings may be a more useful measure of earnings for large populations if there are sizeable disparities between median and average earnings, which there often are given that a small fraction of the population enjoys incredibly large incomes, which has more impact on average earnings than on median earnings.

Nationally, the differences between median and average earnings by educational attainment can be substantial particularly for those with four-year and advanced degrees. For example, average earnings for those with a Bachelor's degree are 12 percent higher than median earnings. (See Appendix for details.)

Exhibit 9 supplies statistical detail regarding average earnings and tax payments. The more educated a person, the more likely they are to produce higher tax payments. For instance, those with less than a high school diploma paid an estimated \$533 in State of Maryland income taxes in 2017. Those with a graduate or professional degree paid nearly \$4,200, or an amount roughly 8 times greater.

Exhibit 9. Economic Characteristics and Educational Attainment, Maryland 2017

Educational attainment	Less than a high school diploma	High school diploma or equivalent	Some college or Associate degree	Bachelor's degree	Graduate or professional degree
Average earnings, 2017	\$25,796	\$36,348	\$42,098	\$68,973	\$103,549
Income tax, federal	(\$4,773)	(\$2,492)	(\$998)	\$2,961	\$7,130
FICA	\$1,973	\$2,781	\$3,220	\$5,276	\$7,922
Federal taxes	(\$2,800)	\$289	\$2,222	\$8,237	\$15,052
Maryland state income taxes	\$533	\$1,002	\$1,275	\$2,552	\$4,194
Maryland, other state taxes	\$411	\$773	\$983	\$1,968	\$3,234
Maryland local income taxes	\$370	\$666	\$838	\$1,645	\$2,682
Maryland local property, other taxes	\$657	\$1,184	\$1,491	\$2,924	\$4,768
Maryland state and local taxes	\$1,971	\$3,624	\$4,587	\$9,088	\$14,878

Sources. Federal Reserve Bank of Richmond, eFile, Comptroller of Maryland, Sage

The relationship between educational attainment and contributions to public finances is even starker at the federal level. Estimates of federal income tax and FICA are also listed in Exhibit 9.¹⁹

Because of federal tax credits for earned income and children, those with lower earnings pay negative taxes. That is, these filers receive refunds when they file federal taxes. FICA represents the Social Security and Medicare taxes paid at a rate of 7.65 percent by employees.

As is well known, Maryland State and local individual income taxes represent principal sources of revenue for state and local government. Because Maryland's state individual income tax represents a little over half of all State general fund revenues, a reasonable estimate can be made of other state

¹⁹ Taxes are estimated using several methods. Estimates presume that taxes are filed by a married couple with one child. This filing status results in a relatively low tax obligation. For example, single filers with equivalent incomes would pay substantially more Maryland local income and other taxes. Federal taxes would increase even more for single filers who would not qualify for child tax credits. Federal income taxes were estimated using eFile's online tax calculator for 2019. FICA taxes were estimated at 7.65 percent of earnings. Maryland State and local income taxes were estimated using the Comptroller of Maryland's tax calculator. Maryland State individual income tax accounts for 56 percent of State general fund revenue for FY2019. Other Maryland estimated State tax revenues are prorated based on this figure.

taxes that correlate with this individual income tax including sales and use taxes, corporate income tax, and other taxes and fees.

For local government, income tax represents a significant source of revenue, but not as important as property tax. These two taxes collectively account for approximately 90 percent of local governments' general fund revenues in Maryland, with income tax representing 36 percent of this total and property tax representing 54 percent. Other taxes and fees contribute 10 percent of general funds for local government. An estimate of total local property tax revenue generated by the earnings shown in Exhibit 5 is based on estimated local income tax.

While educational attainment stops at a point in time, the impacts of educational attainment continue for a lifetime. Therefore, it is useful to examine long-term economic and fiscal impacts.

Each cohort of public-school students represents a population that will generate earnings over the course of their working lives. These lifetime earnings can be estimated by considering the likely earnings of each former public-school student, the likelihood that they will participate in the labor force and be employed, and the likely number of years they will work. Using average earnings from 2017 adjusted by both labor force participation rates and unemployment rates, Sage has estimated the net present value of the lifetime earnings of individuals.²⁰

As shown in Exhibit 10, estimates of lifetime earnings vary substantially by level of educational attainment. Those not completing high school have lifetime earnings valued at \$447,000, while those who hold graduate or professional degrees have lifetime earnings estimated at \$2.4 million.

As indicated, each step up the ladder of educational attainment creates a significant increase in value relative to those not completing high school. Similarly, each step in that ladder of educational attainment generates an increase in the estimated value of lifetime earnings. These earnings increase with educational attainment despite the fact that the achievement of greater education generally results in fewer years in the labor force. For example, it is assumed that those who have graduate or professional degrees spend seven years in postsecondary education whereas those who do not earn a high school diploma are assumed to enter the labor force when they are 18 years of age.

The literature indicates that these individual or private earnings are also associated with a broader economic productivity spillover effect. Specifically, research indicates that as a population becomes more educated, the business community is more likely to invest in the local economy and workers are increasingly able to learn from one another. Both effects further human capital development

²⁰ Net present value represents an estimate of the value in today's dollars of a future stream of income. See Appendices for discussion of discount rate, wage inflation, years in work life, and other details.

and support a more vibrant and productive economy. Thus, as a community's educational attainment increases, so do community-wide wages.

A low-end estimate of the value of this economic spillover effect is 37 percent of the earnings of individuals.²¹ Exhibit 10 also details the social and productivity gain associated with listed earnings. This productivity gain represents the sum of the lifetime earnings and the 37 percent spillover effect. The increased value of this productivity gain over a lifetime of an individual with a college degree or a graduate or professional degree is \$1.7 million to \$2.7 million greater, respectively, than that of an individual failing to complete high school.

Exhibit 10. Lifetime Earnings and Productivity Impacts (Net Present Values in Thousands)

Educational attainment	Less than a high school diploma	High school diploma or equivalent	Some college or Associate degree	Bachelor's degree	Graduate or professional degree
Lifetime earnings	\$447	\$757	\$949	\$1,676	\$2,402
Increase from high school dropout		\$311	\$503	\$1,229	\$1,955
Social and productivity gain	\$612	\$1,038	\$1,300	\$2,296	\$3,290
Increase from high school dropout		\$426	\$688	\$1,684	\$2,678

Sources. Federal Reserve Bank of Richmond, Levin, et al, Sage

In similar fashion, the lifetime tax payments of individuals can be estimated from their lifetime earnings. Exhibit 11 supplies the net present value of these tax payments for each level of educational attainment. The difference in State and local tax payments from those who fail to earn a high school diploma to those individuals with a graduate/professional degree is in the range of \$310,000 over a lifetime.

Exhibit 11. Lifetime tax Payments, Federal, State & Local (Net Present Values in Thousands)

Educational attainment	Less than a high school diploma	High school diploma or equivalent	Some college or Associate degree	Bachelor's degree	Graduate or professional degree
Maryland state and local taxes	\$34	\$76	\$103	\$221	\$345
Increase from high school dropout		\$41	\$69	\$187	\$311
Federal income tax	(\$83)	(\$52)	(\$23)	\$72	\$165
Increase from high school dropout		\$31	\$60	\$155	\$248

Source. Sage

²¹ Op. cit., Belfield

➤ *Social Impacts Associated with Educational Attainment*

Not only are there positive public revenue implications associated with higher educational attainment, there are also large-scale cost savings. As educational attainment and earnings increase, the need for certain types of public assistance decreases. Significant sources of public assistance include Medicaid, food stamps (also known as SNAP), and welfare (including TANF).²² These types of public assistance are provided to those in economic need.

Economic need can vary over time as individuals struggle with unemployment and other sub-optimal economic outcomes. It is also influenced by general economic conditions. For example, during the Great Recession, the need for public assistance and government support rose significantly as more individuals lost work and earnings plummeted. Although general economic conditions can increase or decrease overall demands for public assistance, educational attainment consistently correlates (inversely) with the demand for public services and supports.

Exhibit 12 provides illustrative information regarding various types of public assistance in Maryland and how they are affected by varying degrees of educational attainment. Public assistance is fundamentally designed to address problems related to poverty. As indicated in the exhibit, people living below the poverty line can be associated with any conceivable level of educational achievement. However, educational attainment is clearly inversely correlated with poverty.

According to the U.S. Census Bureau, almost one in four of those with less than a high school education lives below the poverty line. For those with a high school diploma or its equivalent, this rate is effectively cut in half to 12.7 percent. For those who have attended college and especially for those who have earned a college degree, the rate of poverty is lower still.

Similarly, those with lower levels of education are more likely to receive public assistance in the form of Medicaid, food stamps, and welfare payments. As indicated by Exhibit 8, 38 percent of Marylanders with less than a high school diploma are estimated to be covered by Medicaid while only 3 percent of those with an advanced degree are covered by Medicaid.

A similar pattern is apparent for food stamps, with 34 percent of those with less than a high school diploma receiving food stamp benefits and 4 percent of those with an advanced degree receiving such benefits. The share of households receiving public welfare is much lower, but the pattern

²² SNAP is an acronym for the Supplemental Nutrition Assistance Program. TANF is an acronym for Temporary Assistance for Needy Families.

holds with 4 percent of those with less than a high school diploma receiving TANF benefits while no more than 1 percent of those with a college degree receive these benefits.

Using percentages of persons receiving public assistance by educational attainment, an estimate of the average annual benefit for each person in Maryland with that level of education can be computed. Exhibit 12 lists the average benefit for Medicaid, food stamps, and welfare for recipients based on educational attainment. The value of these benefits applies to all Maryland adults in each category of educational attainment, though of course not all adults receive social assistance. Thus, the average Maryland adult who did not finish high school receives \$2,627 in Medicaid assistance, \$547 in food stamp assistance, \$325 in welfare payments, and \$369 in housing and energy assistance.

Exhibit 12. Educational Attainment and Public Assistance, Maryland

Educational attainment	Less than a high school diploma	High school diploma or equivalent	Some college or Associate degree	Bachelor's degree	Graduate or professional degree
Persons below poverty	25%	13%	9%	5%	5%
Health insurance					
Covered by private health insurance	42%	61%	70%	82%	82%
Covered by Medicaid	29%	17%	14%	6%	6%
Share of all persons receiving public assistance					
Medicaid	38%	26%	18%	5%	3%
Food stamps (SNAP)	34%	26%	18%	6%	4%
Public Assistance (including TANF)	4%	3%	2%	1%	0%
Housing and energy assistance	34%	26%	18%	6%	4%
Average annual benefit per person/household receiving assistance					
Medicaid	\$2,627	\$2,009	\$1,428	\$464	\$309
Food stamps (SNAP)	\$547	\$374	\$252	\$72	\$43
Public Assistance (including TANF)	\$325	\$244	\$162	\$81	\$0
Housing and energy assistance	\$369	\$115	\$142	\$29	\$22

Sources. Current Population Survey, American Community Survey, Center on Budget and Policy Priorities, Sage

Given the value of annual public assistance benefits, the lifetime costs of public assistance can be estimated. Exhibit 13 presents these estimates of the lifetime value of public assistance for Medicaid, food stamps, and welfare by level of educational attainment. These values are calculated in the same fashion as the lifetime values of earnings and tax payments shown in exhibits 10 and 11, respectively. As indicated, the value of the average total lifetime benefit for a Maryland adult with less than a high school diploma is more than \$60,000, while the analogous benefit for a college graduate is \$15,000 and \$8,000 for the holder of an advanced degree.

Exhibit 13. Educational Attainment and Lifetime Costs of Public Assistance, Maryland

Educational attainment	Less than a high school diploma	High school diploma or equivalent	Some college or Associate degree	Bachelor's degree	Graduate or professional degree
Medicaid, average lifetime benefit per person	\$45,486	\$41,857	\$32,197	\$11,273	\$7,167
Food stamps (SNAP), lifetime annual benefit per person	\$9,471	\$7,792	\$5,682	\$1,749	\$997
Public Assistance (incl. TANF), average lifetime benefit per household	\$5,627	\$5,084	\$3,653	\$1,968	\$0
Housing and energy assistance	\$6,389	\$2,396	\$3,202	\$705	\$510
Total lifetime benefit	\$66,973	\$57,130	\$44,733	\$15,695	\$8,674

Sources. Current Population Survey, American Community Survey, Center on Budget and Policy Priorities, Sage

• Law & Order

The socioeconomic consequences of educational attainment hardly end there. Prisons in Maryland and throughout the United States are disproportionately full of individuals who fail to earn a high school diploma.

In 2011, the Maryland General Assembly created a task force to study the relationship between high school dropouts and persons in Maryland's criminal justice system. The associated 2012 report indicated that an estimated 43 percent of Maryland state prisoners 25 years old and younger had failed to complete high school while another 17 percent had completed high school but had no additional educational attainment. Almost 18 percent of those state prisoners left school and were transferred to another institution. Often this transfer was to supervision by the Department of Juvenile Services.

The task force assumed that many of the former students involved in these transfer cases never return to school. As a result, the task force estimated that more than 57 percent of state prisoners 25 years and younger were high school dropouts.²³

The costs of the criminal justice system related to these high school dropouts are substantial. The task force estimated that, in 2011, \$427 million was spent to incarcerate 12,000 adult dropouts in state prisons based on an annual cost in 2011 of \$34,842 to incarcerate a prisoner for one year. The task force also found that nearly 43 percent of high school dropouts entered the Maryland juvenile justice system.

Using task force data regarding the proportion of state prisoners who either fail to complete high school or only have a high school diploma, an estimate of the educational attainment of Maryland's

²³ Task Force to Study High School Dropout Rates of Persons in the Criminal Justice System, "School dropouts and their impact on the criminal justice system," December 2012.

current adult prison population can be generated. These high school dropouts and those whose education stopped with a high school diploma constitute nearly three out of four state prisoners. Based on other literature, it is estimated that 19 percent of these adult prisoners attended college but did not earn a degree and that a bit more than 6 percent of adult prisoners have a college degree.²⁴

In FY2018, the Maryland Department of Corrections reported 18,635 prisoners in state prisons with almost 90 percent of these prisoners aged 25 or older. The Department of Corrections budget during that fiscal year for operating costs, capital construction, and facilities management related to state prisons totaled approximately \$870 million or \$46,735 per prisoner. The Department of Corrections also reported that the average prisoner spent 82 months in prison. Within three years of being released, an average of 40.5 percent of state prisoners returned to prison.

These data/parameters pave the way for an estimate of the number of prisoners at each level of educational attainment as well as the percentage of the overall Maryland adult population that these prisoners represent. For example, Maryland's population 25 years and older with less than a high school diploma is estimated at 417,716 persons for the relevant period of analysis. The 9,492 adult state prisoners who fail to finish high school represent 2.3 percent of Maryland's adult population failing to complete high school.

Similarly, 0.3 percent of the Maryland adult population with a high school diploma or its equivalent are estimated to be incarcerated in state prisons. For those with some college experience, but no degree, an estimated 0.4 percent of the total Maryland adult population is incarcerated, while 0.1 percent of the Maryland adult population who hold a college degree are estimated to be incarcerated.

These percentages of the total Maryland adult population who are incarcerated in state prisons allow for an estimate of the lifetime incarceration costs for the average Maryland adult by educational attainment. These lifetime costs are based on the estimate that the typical Maryland prisoner spends seven years in prison at an annual cost in 2018 of \$46,735.

The estimate also incorporates a presumption that once released the former prisoner receives community supervision (i.e. parole) for one year at a cost of \$3,126. Given a recidivism rate of 40.5 percent, it is assumed that that proportion of adult prisoners returned to prison for another 7 years followed by another year of community supervision. The current total value of this stream of future incarceration and community supervision costs is estimated at more than \$386,000/prisoner.

The costs of incarceration represent only a subset of the costs of crime. The greatest social burden of crime is felt to be that borne by the victims of crime in terms of their reduced quality of life, any losses of income (e.g., from being unable to work), and monetary losses associated with the crimes.

²⁴ See Appendices for more detail on incarceration rates by educational attainment.

In addition, the general population incurs costs trying to avoid being victimized by crime. The literature and research indicate that this social burden of crime is valued minimally at 2.5 times the direct cost of crime.²⁵

Exhibit 14 summarizes lifetime costs of incarceration and the social burden associated with that cost by level of educational attainment. Costs are allocated on a per Maryland adult basis.

For example, 2.3 percent of Maryland adults without a high school diploma are estimated to be incarcerated in state prisons. Thus, for all Maryland adults without a high school diploma the average incarceration cost is 2.3 percent of the estimated lifetime incarceration cost measured in net present value for one prisoner (2.3% of \$386,000) or \$8,774. The related social burden of this cost is almost \$22,000 and the total cost of incarceration including this burden is in excess of \$30,000.

These average lifetime costs for Maryland adults fall dramatically as educational attainment increases to roughly \$700 for those with a high school diploma, to \$16 for those who attended college but did not earn a degree, and to \$0 for those who earned a college degree. The notion is that these costs can be substantially reduced through improved educational outcomes.

Exhibit 14. Educational Attainment and Lifetime Costs of Incarceration, Maryland

<i>Characteristic</i>	<i>No HS diploma</i>	<i>HS grad, only</i>	<i>Some college, no degree</i>	<i>College degree</i>
Share of prison population	57.2%	17.2%	19.0%	6.6%
No. of prisoners 25 and older	9,492	2,854	3,153	1,095
Prisoners as share of population 25 and older	2.3%	0.3%	0.4%	0.1%
Prorated lifetime incarceration cost per adult 25 and older in Maryland population	\$8,774	\$199	\$5	\$0
Social burden of crime	\$21,935	\$498	\$11	\$0
Total costs of incarceration	\$30,709	\$698	\$16	\$0

Source: Sage

While incarceration in state prisons is a significant expense, it is not the only source of public costs for criminal justice and public safety. Expenses also include policing, local jails, courts, and juvenile justice. Increasing educational attainment would almost certainly lead to reductions in these costs as well as costs to operate state prisons.

Determining a clear relationship between better education and reduced costs of these criminal justice and public safety activities, however, is complicated and beyond the scope of this analysis. Thus, the estimates of lower criminal justice costs defined as lower state prison operating and maintenance costs should be considered a conservative estimate of these impacts. That is, a better

²⁵ Op. cit., Belfield.

educated population would result in greater savings in criminal justice and public safety spending than is estimated here.

➤ *Economic, Fiscal, & Social Implications of Educational Attainment*

Assessments of earnings, tax payments, and social costs of individuals with varying degrees of educational attainment discussed above can be summarized for expected cohorts of Maryland public-school students. Exhibit 15 presumes that current cohorts of students in each high school grade in Maryland total about 69,000 students. Given the ultimate educational attainment of current Maryland public-school students shown above in Exhibit 3, the number of students at each level of attainment can be estimated. These estimates range from almost 9,000 students who failed to complete high school to more than 17,000 who earn a college degree.

As noted above, a significant share of those who earn a Bachelor's degree go on to earn an advanced degree. Consequently, it is estimated that in current cohort of Maryland public-school students, 15.8 percent will earn a Bachelor's degree and 9.3 percent will earn an advanced degree.

The exhibit lists the lifetime earnings and tax payments as well as the estimated lifetime value of public assistance and incarceration for each level of educational attainment. From a fiscal perspective, lifetime public assistance costs are deducted from lifetime Maryland State and local tax payments to estimate the excess of tax payments over public assistance payments.

As indicated, for those lacking a high school degree, there is no excess State and local tax payment. In fact, for the least educated Marylanders, estimated lifetime tax payments will not cover the estimated lifetime public assistance costs they generate.

Exhibit 15. Economic and Fiscal Impacts and Social Costs of Current Student Outcomes (Millions \$2017)

Educational attainment	Less than a high school diploma	High school or equivalent	Some college or Associate degree	Bachelor's degree	Graduate or Professional degree	Total
No. of students by outcome (Share)	8,970 (13.0%)	15,180 (22.0%)	27,531 (39.9%)	10,902 (15.8%)	6,417 (9.3%)	69,000 (100.0%)
Lifetime earnings w/ social gain	\$5,489	\$15,750	\$35,801	\$25,028	\$21,113	\$103,181
Lifetime federal income tax	(\$741)	(\$788)	(\$619)	\$784	\$1,061	(\$304)
Lifetime Maryland state and local tax	\$306	\$1,146	\$2,847	\$2,407	\$2,214	\$8,921
Medicaid, average lifetime benefit per person	\$408	\$635	\$886	\$123	\$46	\$2,099
Food stamps (SNAP), average lifetime benefit per person	\$85	\$118	\$156	\$19	\$6	\$385
Public Assistance (incl. TANF), average lifetime benefit per household	\$50	\$77	\$101	\$21	\$0	\$250
Housing and energy assistance, average lifetime benefit per person	\$57	\$36	\$88	\$8	\$3	\$193
Incarceration costs and crime burdens	\$275	\$11	\$0	\$0	\$0	\$286
Maryland taxes less assistance	(\$570)	\$268	\$1,615	\$2,236	\$2,159	\$5,708

Source: Sage

IV. Evidence Based Research on Public-school Interventions

- **Yes, Educational Outcomes Can Be Improved Through Targeted Investment**

The Commission relied on the experience of top performing school systems around the world to determine recommendations for Maryland public-schools. These highly effective systems often perform at the top of the list for international comparisons of student abilities. Countries such as Finland and Singapore achieve the highest scores on the PIAAC assessments discussed above.

The Commission's recommendations also take a systemic approach to improving the outcomes for Maryland public-school students. Research regarding such systemic approaches is limited although the results achieved by top performing systems internationally are clearly better than those achieved by U.S. schools. Maryland public-school results are roughly equivalent to those of the average U.S. school system.

As noted in the gap analysis described above, the success of top performing school systems is attributable to a wide range of factors that begin well before children enter school. For example, services that support new mothers and their infants and toddlers can improve the health status of young children and help them be more successful in school. The Commission's recommendations for support of children and their families before beginning school (e.g., expanded Family Support Centers and Judy Centers) acknowledges the significance of these types of programs.

The preponderance of Commission recommendations focuses upon reforms and interventions that affect students once they are enrolled in school. There is a substantial body of research regarding educational reforms and interventions that have improved the effectiveness of school systems and increased the likelihood that students will be successful within those systems.

The Institute of Education Sciences, an element of the U.S. Department of Education, created the What Works Clearinghouse (WWC) in 2002. The WWC is a repository of research that embodies thousands of studies of educational reforms and interventions. Individual studies are evaluated in terms of their ability to meet WWC standards for research integrity and the strength of evidence that the study results and findings were effective. The discussion below highlights some, but certainly not all, of this literature.²⁶

²⁶ Institute of Education Sciences, What Works Clearinghouse. <https://ies.ed.gov/ncee/wwc/>. Many of the studies described here were also cited in the study of the Colorado school system by Belfield and Levin, 2011.

It should be noted that Commission recommendations embrace more of a systematic perspective on interventions and reform. There are almost certainly synergies between and among various Commission recommendations.

Available literature, however, tends to look at individual interventions and reforms. Consequently, the discussion below tends to apply at best to some aspects of the Commission recommendations but does not address a broad and comprehensive set of simultaneous interventions. Accordingly, the intent of citing some of the research regarding educational interventions is to clarify that considerable research has been conducted indicating that educational reforms and interventions can produce tangible educational and economic value. There is some cynicism regarding the ability to move student achievement forward. Research strongly suggests reason for hope.

➤ *Toward a Higher High School Graduation Rate*

Better, more effective teachers improve outcomes for high school students. Paying teachers more is a well-researched method for improving teacher effectiveness by increasing the quality of those who choose teaching as a career, reducing turnover (which is notoriously high for talented young teachers), and creating motivations for teachers to continue in their careers. One state-level analysis reported that a 10 percent increase in all teacher salaries from kindergarten through high school resulted in an increase of five percentage points in the number of high school graduates.²⁷

One of the largest effects on high school graduation rates has been observed in conjunction with among the earliest of possible interventions. High quality preschools or pre-kindergartens have been associated with not only increased high school graduation rates, but also reduced requirements for special education. These programs have increased high school graduation rates by 11 percentage points to 19 percentage points.²⁸

The Perry Project has studied an innovative preschool program developed in the 1960s in Michigan. The program was designed to serve preschool students who were at risk of failing in school. By randomly assigning 123 students to a high-quality program and comparing them to a matched control group receiving no preschool education, researchers were able to isolate the effects of the preschool program on student careers. Students in the preschool program graduated from high school at substantially higher rates than the control group (77 percent versus 60 percent). When tested for IQ at age 5, 67 percent of the children in preschool had IQs of at least 90 while 28 percent of the students who did not participate in preschool scored this well.

²⁷ Loeb and Page, 2000.

²⁸ Temple and Reynolds, 2007; Nores et al, 2005.

Researchers followed these two groups for decades and found that students who attended preschool had higher earnings at age 40 and were also less likely to be arrested by the time they were 40. These preschool students also produced fewer teenage pregnancies and were more likely to own a home and an automobile.²⁹

The Child-Parent Center program in Chicago provides support for both preschool students and their families. Started in 1967 to serve families in high-poverty areas not served by Head Start, the program requires active participation of parents and works with students and their families until third grade. Operated by Chicago Public-schools, the program now functions at 11 sites.

In comparison to a matched control group, children in the program earned more as adults and paid more in taxes. They were less involved in the criminal justice system. As public-school students, they were less likely to require special education services or to be retained in grade. Analyses of the program have consistently found substantial returns on public spending for the program.³⁰

The Abecedarian Project provides full-time, high-quality educational intervention for children from infancy through age five. Individualized education plans focus on social, emotional, and cognitive development with an emphasis on language. Researchers have studied participants into adulthood with assessments beginning at age five and continuing into the mid-30s. Findings include higher scores on math and reading tests, lower levels of grade retention, and fewer special education placements. At age 30, participants were more likely to hold a bachelor's degree, to have a job, and to be associated with delayed parenthood.

Importantly, teenage mothers of Abecedarian Project participants were more likely to finish high school, less likely to have additional children, to generate higher earnings, and to be associated with less reliance on public assistance. These factors contributed to the finding that taxpayers saved \$2.50 for every \$1.00 spent on the program. A 2014 follow-up study found participants enjoyed better health than those who did not participate, including lower rates of hypertension, lower risk of coronary heart disease, and lower rates of obesity.³¹

The Early College High School Initiative was created in 2002 to increase opportunities for underserved students to earn post-secondary degrees or other credentials. Participating students are exposed to college while still in high school and provided support. Participants have an opportunity to earn an Associate degree or two years of college credits while still in high school. The program

²⁹ High Scope, "Perry Preschool Project". <https://highscope.org/perry-preschool-project/>.

³⁰ Reynolds, et al. "Age 26 cost-benefit analysis of the child-parent center early education program." 2011.

³¹ FPG Child Development Institute of the University of North Carolina at Chapel Hill. "The Carolina Abecedarian Project". <https://abc.fpg.unc.edu/abecedarian-project>.

increased high school graduation rates five percentage points, from 81 percent to 86 percent. The share of those earning college degrees rose from 4.7 percent to 24.9 percent.³²

First Things First is a high school intervention that emphasizes small learning communities, long-term student teacher relationships, mentoring, teacher advocacy for individual students, and a rigorous curriculum. Students participating in this program improved high school graduation rates by 16 percentage points.³³

Achievement for Latinos through Academic Success is a program that assigns counselors to individual students. These counselors monitor student attendance, behavior, and academic progress. Research indicates that the program reduced the likelihood of students dropping out of high school and had the potential of increasing graduation rates by five percentage points.³⁴

Twelve Together provides peer support and mentors for middle school and high school students. It also offers weekly discussion groups after school. Researchers determined that eighth graders who participated in this program were associated with reduced high school dropout rates of five percentage points.³⁵

Career Academies seek to improve employment readiness by creating work experiences for high school students. These programs typically work as schools within schools. When targeted to at risk students, they show a potential for increasing high school graduation rates by 11 percentage points.³⁶

Check & Connect monitors and assesses student performance and provides mentors for at-risk students. One assessment determined that the program could raise high school graduation rates by 17 percentage points.³⁷

Talent Search provides academic support for students at more than 400 sites. Compared to students who do not participate in the program, students in Talent Search graduated from high school at rates nine percentage points higher.³⁸

³² Berger, Andrea et al, “Early College, Early Success: Early College High School Initiative Impact Study.” American institutes for research. 2013.

³³ Levin et al, 2007.

³⁴ Gandara et al, 1998.

³⁵ Dynarski et al, 1998.

³⁶ Kemple and Snipes, 2000.

³⁷ Sinclair et al, 2005.

³⁸ Constantine et al, 2006.

Success for All is a whole-school reform program focused on at risk students in grades kindergarten through five. The program has demonstrated improved test scores for eighth graders, reductions in the need for special education, and reductions in the rate of grade retention.³⁹

➤ *Measured Returns on Investment*

The interventions in school reform cited above all require additional funding. Whether this spending is justified can be answered in part by looking at the fiscal benefits versus costs for most of these programs.

Exhibit 16 summarizes research on many of the programs cited above in terms of increased high school graduation rates. A critical factor in determining the cost-effectiveness of these interventions is the extent to which they are targeted to those students who are most in need of the services the interventions supply. Fiscal benefit/cost ratios can range widely based on whether there is no effort to target the intervention to those who need them or whether they are perfectly targeted.

Given the Commission's focus on providing additional resources to at-risk students, the exhibit lists the midpoint of these ranges for each intervention. The midpoint of the benefit/cost range for all of these interventions is in excess of 1.

Exhibit 16. Educational Interventions and Their Benefits and Costs

Intervention	Extra graduates per 100 students	Midpoint of fiscal benefit/cost estimates
10% increase in teacher salaries (K-12)	5	8.0
Chicago Child-Parent Center Program	11	10.1
High Scope Perry Preschool Program	19	5.2
Expansion of Head Start	4	6.3
First Things First	16	13.3
Achievement for Latinos through Academic Success	5	22.9
Twelve Together	5	18.1
Career Academies	11	21.2
Check & Connect	17	16.0
I Have a Dream	10	4.1
Talent Search	9	79.3

Source: Belfield and Levin (2011).

³⁹ Borman and Hewes, 2003.

➤ *A Maryland Example of Successful Intervention*

Thread is a program that works with students in three Baltimore City schools: Paul Laurence High School, The Academy for College and Career Exploration, and Frederick Douglass High School. Using volunteers, Thread works with students who are typically in the bottom quartile on a range of measures, both academic and socioeconomic.

Volunteers provide individualized support year-round including rides to schools, tutoring, and buying groceries. The intention is to create strong interpersonal bonds between students and volunteers assigned to work with him or her. Additional volunteers provide support in academic advancement, college and career preparation, and opportunities for students to engage in community service. Additional pro bono collaborators supply legal, health, and housing support, employment opportunities, and other services.

Thread recruits students when they are in the 9th grade. Currently, students sign up for a 10-year commitment with Thread. Thus, Thread engages with students for up to 6 years after they have completed high school.

To date, Thread has worked with 527 students. Within 6 years of joining Thread, 85 percent of students graduated from high school. Among students who have participated in the Thread program for at least a decade, 83 percent have earned degrees or certificates from two-year or four-year colleges.

Thread's ability to achieve an 85 percent high school graduation rate for its students represents a major achievement. This rate nearly equals the statewide high school graduation rate. The fact that 83 percent of Thread participants have earned degrees from two-year and four-year colleges represents a stark and positive departure from statewide averages. As noted above, 29 percent of Maryland students entering high school in 2010 have earned degrees from two-year or four-year colleges.⁴⁰

➤ *Comprehensive Reform in Massachusetts*

With the Massachusetts Education Reform Act of 1993, Massachusetts implemented a comprehensive set of educational reforms that supplies a case study and statistical evidence regarding the potential educational and economic impacts of far-reaching reform. Like the Kirwan

⁴⁰ Thread. <https://www.thread.org/>.

Commission, these reforms were developed by an array of educational stakeholders: educators, parents, and the business community.⁴¹

The business community was a key participant. Observers give credit to the Massachusetts Business Alliance for Education (MBAE) for developing the blueprint for and proposing many of the policy recommendations of the Reform Act. MBAE advocated for a budget that, among other things, doubled funding for low-income districts. It also supported the requirement that tenth graders pass Massachusetts Comprehensive Assessment System (MCAS) tests. The MBAE was motivated by a concern that a failure to improve elementary and secondary education would erode “the foundations of the future economic strength of the Commonwealth” and significantly deteriorate “the very fabric of the democratic society of informed citizens.”

Major elements of the Reform Act include:

- Statewide curriculum frameworks and learning standards. These standards were created to guide teachers’ lesson planning and districts’ curriculum planning.
- Comprehensive assessments. The MCAS, given to fourth, eighth, and tenth grade students, was developed to align with the curriculum frameworks and to identify individual students and school districts in need of additional attention.
- Graduation standards and vocational pathways. All students must pass the MCAS to graduate. Those who pass the test can achieve occupational proficiency certificates.
- Additional resources for poorer school districts. State funding was significantly increased for all districts; allocations were designed to rectify inequities between more affluent and less affluent districts.
- Increased learning time. School districts were required to demonstrate scheduling 900 hours of learning time for elementary school students and 990 hours for secondary school students.

⁴¹ The discussion of the Massachusetts Education Reform Act of 1993 is based on several sources, including Chieppo, Charles and Jamie Gass, “How Massachusetts Showed the Way on Education Reform,” *The American Conservative*, May 13, 2019 <https://www.theamericanconservative.com/articles/how-massachusetts-showed-the-way-on-education-reform/>; DiCara, Lawrence S., “Funding plus reform right equation for education legislation, State leaders should stay true to successful 1993 approach,” *Commonwealth Magazine*, June 16, 2019 <https://commonwealthmagazine.org/education/on-ed-funding-overhaul-stay-true-to-our-course/>; Gabor, Andrea, “An education reform law that worked,” *Boston Globe*, July 3, 2018 <https://www.bostonglobe.com/opinion/2018/06/11/education-reform-law-that-worked/sDl5ewacbQvW5kZHqfpPzM/story.html>; Worcester Education Collaborative, “A Primer on Education Reform in the Commonwealth: Federal and State Policy” <https://static1.squarespace.com/static/58d54b22e58c628ea813be8e/t/599356b3d482e90ebb8e33f3/1502828212400/A-Primer-on-Education-Reform-v1.0-final-9281.pdf>

- Improved teacher qualifications. Tests were developed to assure that new teachers had communication and literacy skills and proficiency in their subject areas. Testing also applied to current teachers.
- Enhanced accountability. Increased funding was tied to a variety of accountability measures designed to assure that additional resources resulted in better outcomes. Accountability included oversight and monitoring of school district performance. For “under-performing” districts, consequences encompass increased oversight, including receivership.

Impacts on student learning and outcomes were significant.

- Beginning with 1993, when the reforms were first instituted, statewide SAT scores rose for 13 consecutive years.
- A similar improvement was observed in scores on the National Assessment of Educational Progress (NAEP), a national assessment of fourth and eighth grade students in math and English. By 2005, Massachusetts became the *first state* to have both its fourth and eighth grade students achieve the best scores in the nation in both subjects. This across-the-board best in the nation result has been achieved in each year save one since 2005.
- In 2007 and 2011, the results of Trends in International Mathematics and Science Study (TIMSS) found that Massachusetts’ students were competitive with students in such high-performing countries as Japan, Korea, and Singapore. The 2007 TIMSS results in science showed that Massachusetts eighth graders were tied for first place internationally.
- Massachusetts was among the top three states in terms of reducing race- and class-based achievement gaps between 1998 and 2005. Between 2002 and 2009, NAEP scores for African-American and Hispanic fourth and eighth graders increased more rapidly than those of white students.
- Proficiency scores in English and mathematics increased substantially. In 1998, the share of 10th graders who were proficient in English was 38 percent while those proficient in mathematics was 24 percent. A recent article reports that presently 91 percent of tenth graders are proficient in English and 78 percent are proficient in mathematics.

Unlike many of the interventions and reforms described earlier, the Massachusetts experience represents a comprehensive program instituting systemic reforms. For this reason, it parallels Kirwan Commission recommendations far better than other examples cited in this Sage study.

Like Massachusetts, Kirwan Commission recommendations call for more highly qualified teachers, curricular reforms that include vocational certificates, and more equitable funding through additional resources for poorer districts in particular. One of the more important parallels may be the emphasis on accountability to assure that additional resources actually generate superior outcomes.

V. Estimated Impacts of Commission Recommendations

The following table supplies an estimate of what would occur if Commission's recommendations were implemented with fidelity, oversight, and measurement. It is based on the assumption that if the proportion of Maryland's students who are proficient in English 10 and Algebra I doubles from its current level, the share of students earning a Bachelor's degree or an advanced degree would also double. By the same token, the rate of dropouts and those stopping at a high school diploma would be sliced in half.

Another important aspect of the projected change in student outcomes is the number of students who will earn vocational certificates. These certificates would serve as credentials smoothing entry into a number of high skilled, high earning career paths that do not typically require traditional four-year college degrees. This represents an important element of the goal of having 80 percent of Maryland students career and college ready by high school completion.

Proficiency in English and mathematics are central measures of high school students' readiness for college or a career. As noted above in Exhibit 7, proficiency scores in English 10 (42.4 percent) and Algebra I (31.2 percent) of current Maryland high school students are well below the goals of the Commission to have 80 percent of high school graduates ready for college or a career. This goal would roughly double the share of Maryland high school graduates who are prepared to be successful in post-secondary education and/or career paths.

Exhibit 17 indicates how a doubling of proficiency in basic skills and human capital could affect educational attainment. The share of Maryland students earning bachelor's or advanced degrees is assumed to increase from 25 percent to 50 percent. Those earning a two-year degree, vocational certificate, or having some college experience would decrease from 40 percent to 32 percent, but would include a higher proportion of students who have earned either Associate degrees or vocational certificates.

Given the Commission's projection that 45 percent of future cohorts will enter apprenticeships or earn other industry certified credentials, it is likely that many who stop their education at a high school diploma as well as those who go on to college will be better prepared for success in the world of work and will earn more than their counterparts operating under Maryland's status quo. It is assumed that the shares of those stopping at a high school diploma or failing to graduate high school would be cut in half.

Exhibit 17. Comparison of Estimated Outcomes for Current Maryland Public-school Students and Outcomes Resulting from Implementation of Commission Recommendations

Educational attainment	Less than a high school diploma	High school diploma or equivalent	Some college or Associate degree	Bachelor's degree	Graduate or Professional degree	Total
Status quo for students entering high school in 2010						
No. of students by outcome (Share)	8,970 (13.0%)	15,180 (22.0%)	27,531 (39.9%)	10,902 (15.8%)	6,417 (9.3%)	69,000 (100.0%)
Potential impacts of Commission recommendations on future cohorts						
No. of students by outcome (Share)	4,485 (6.5%)	7,590 (11.0%)	22,287 (32.3%)	21,804 (31.6%)	12,834 (18.6%)	69,000 (100.0%)
Estimated change in student outcomes						
Change in educational attainment	-4,485	-7,590	-5,244	10,902	6,417	0

Source. Sage

Economic impacts of improved public-school outcomes would be substantial and comprehensive. As discussed above, educational attainment positively correlates not only with income and lifetime earnings, but also with the demands for public services and assistance. Educational attainment also correlates with involvement (or lack thereof) in the criminal justice system.

Research also indicates that more effective education systems can have significant impacts on health and health-related issues. At-risk students who are well served by schools, starting with preschools, are healthier as adults and also exhibit reduced rates of teenage pregnancy.

The assessment of how current outcomes for Maryland public-school systems affect lifetime earnings, tax payments, and demands for a few key public services was presented in Exhibit 11 in a previous section of this report. This assessment represents a baseline against which impacts of the Commission's recommendations can be measured.

Exhibit 18 contains the same basic information as Exhibit 15, but substitutes the superior student outcomes listed in Exhibit 17. Given that there are substantially more four-year college graduates and those with advanced degrees in this cohort of future Maryland public-school students, benefits in terms of income/earnings and tax payments are much higher.

The ability of students to earn vocational certificates also helps to bolster future incomes as a result of implementing Commission recommendations. Unlike the earnings associated with typical educational attainment used in this analysis, earnings of future Maryland students who earn vocational certificates or complete apprenticeships because of implementation of Commission recommendations are more difficult to estimate. Such earnings are likely to vary widely and include

some individuals whose wages and salaries would exceed the average wages for those with four-year degrees.

A recent report listed 10 jobs that do not require a college degree, although most require some type of industry certification, that earn between \$80,000 and \$95,000. For this analysis, the portion of future high school graduates who do not go on to earn college degrees, but who earn vocational certificates are assumed to earn 10 percent more than their counterparts among current Maryland public-school students. This estimate is likely and intentionally conservative and underestimates actual impact.

Because higher levels of education are inversely correlated to the need for many public services and to criminal behavior, costs in terms of public assistance and incarceration are much lower. Exhibit 18 supplies estimates of the ultimate, steady state condition that would ensue if the Commission's recommendations were to be implemented faithfully and Commission estimates of educational improvement prove correct.

Exhibit 18. New Steady-State in Maryland and Associated Estimates of Economic and Fiscal Impacts for Future Cohorts of Entering High School Students (Millions \$2017)

Educational attainment	Less than a high school diploma	High school diploma or equivalent	Some college or Associate degree	Bachelor's degree	Graduate or Professional degree	Total
No. of students by outcome (Share)	4,485 (6.5%)	7,590 (11.0%)	22,287 (32.3%)	21,804 (31.6%)	12,834 (18.6%)	69,000 (100.0%)
Lifetime earnings with social gain	\$2,744	\$8,347	\$30,690	\$50,057	\$42,227	\$134,065
Lifetime federal income tax	(\$371)	(\$304)	(\$168)	\$1,569	\$2,122	\$2,848
Lifetime Maryland state and local tax	\$153	\$631	\$2,514	\$4,814	\$4,428	\$12,540
Medicaid, average lifetime benefit per person	\$204	\$318	\$718	\$246	\$92	\$1,577
Food stamps (SNAP), avg. lifetime benefit per person	\$42	\$59	\$127	\$38	\$13	\$279
Public Assistance (incl. TANF), avg. lifetime benefit per household	\$25	\$39	\$81	\$43	\$0	\$188
Housing and energy assistance, average lifetime benefit per person	\$29	\$18	\$71	\$15	\$7	\$140
Incarceration costs and crime burdens	\$138	\$5	\$0	\$0	\$0	\$143
Maryland taxes less assistance	(\$285)	\$192	\$1,514	\$4,472	\$4,317	\$10,212

Source: Sage

It is useful to juxtapose Exhibit 18 findings against Exhibit 15 findings. Under the status quo, a representative group of Maryland students arriving in high school could be expected to pay approximately \$8.9 billion in State and local taxes over a lifetime. With educational improvements in hand, this same group could be expected to pay nearly \$12.5 billion in State and local taxes.

Differences in outcomes are even starker when one considers analyzed forms of social assistance. Today, the representative group would be associated with roughly \$5.7 billion in Maryland State and local tax payments *in excess of* social assistance receipts. If Commission recommendations are implemented with fidelity and generated estimated outcomes, this same group would be associated with \$10.2 billion in total State and local taxes in excess of social assistance.

➤ *Pre-Kindergarten and Working Parents*

Another effect of implementing Commission recommendations will be relieving those who care for three-year-old and four-year-old children of their childcare responsibilities during school hours. Some of these caregivers may decide to seek employment once their children are enrolled in pre-kindergarten classes.

Publicly funded pre-kindergarten will also save some families the cost of childcare. The cost of childcare in Maryland is substantial. Maryland is ranked seventh nationally among the 50 states. A recent study reported the cost of childcare for infants at more than \$15,000 annually and more than \$10,000 for four-year-olds. These costs can exceed in-state tuition for a four-year public college.⁴²

Accordingly, the availability of publicly funded pre-kindergarten would provide a clear benefit for some families whose children are now in childcare or in private pre-kindergarten programs by reducing or eliminating costs of those programs. Data to determine the extent and value of these savings are not available. To the extent that publicly funded pre-kindergarten would reduce current family expenses, this analysis potentially underestimates the benefits of implementation of the Commission recommendations.

The Bureau of Labor Statistics recently released statistics on families and their participation in the labor force. A majority of parents presently participate in the labor force; both mothers and fathers. Not surprisingly, those whose children are youngest participate at the lowest rates. Nonetheless, almost three of five married mothers with children under three years of age participate in the labor force, while for other mothers with children under three years of age, two of three are in the labor force.

The great majority of working mothers are full-time workers. Labor force participation rates for fathers are consistently higher than those from mothers. Fathers also are more likely to be full-time

⁴² CBS Baltimore, “Childcare In Maryland More Expensive Than In-State Tuition To 4-Year Public College, Report Finds,” July 26, 2019. <https://baltimore.cbslocal.com/2019/07/26/child-care-expenses-in-maryland/>.

workers. Exhibit 19 lists labor force participation rates and unemployment rates and rates for full-time work for parents of children of various ages.⁴³

Exhibit 19. Employment Characteristics of Families, 2018

Employment Characteristics for Demographic Cohorts of Interest	Labor force participation	Unemployment rate	Full-time work
Women with children under 18 years	71.5%		
Married mothers	69.0%	2.5%	
Mothers with other marital status (1)	76.7%	6.4%	
Mothers with children under 6 years	65.1%		
Mothers with children 6 to 17 years	76.4%		
Married mothers with children under 3 years	59.6%	2.6%	
Mothers, other marital status, w/ children under 3 years	67.2%	8.7%	
Fathers with children under 18 years	93.3%		
Married fathers	94.1%	1.9%	
Fathers with other marital status (1)	88.4%	5.7%	
Employed fathers, regardless of children's ages			96.0%
Employed mothers			78.0%
Employed mothers with children 6 to 17			80.0%
Employed mothers with children under 6			75.0%

Source. Bureau of Labor Statistics. Note. 1. Other marital status includes persons who are never married; widowed; divorced; separated; and married, spouse absent; as well as persons in same-sex marriages.

The introduction of pre-kindergarten for three-year-old and four-year-old children will allow some parents to enter or re-enter the labor force. With their young children in school, parents who would otherwise be at home taking care of these children are free to work. This results in an expanded labor force, higher household incomes, and larger tax receipts for federal, State and local governments.

An assessment of universal free preschool in Washington, D.C. found that the availability of pre-kindergarten led to a significant increase in women with young children entering the labor force. In September 2009, Washington, D.C. began to expand its publicly funded pre-kindergarten program. By 2016, roughly 77 percent of all the 3-year-olds and 4-year-olds in the District were enrolled in pre-kindergarten programs, including 90 percent of 4-year-olds and 70 percent of 3-year-olds. Since the introduction of universal pre-kindergarten, the labor force participation rate for Washington's mothers (fewer data are available for fathers) has increased 12 percentage points.⁴⁴

⁴³ Bureau of Labor Statistics. "Employment Characteristics of Families – 2018," April 18, 2019. <https://www.bls.gov/news.release/pdf/famee.pdf>.

⁴⁴ Malik, Rasheed, "The Effects of Universal Preschool in Washington, DC: Children's Learning and Mother's Earnings," September 2018. <https://www.americanprogress.org/issues/early-childhood/reports/2018/09/26/458208/effects-universal-preschool-washington-d-c/>.

The Commission's assessment of publicly funded pre-kindergarten in Maryland includes projections of the number of students who would be enrolled in new programs. These projections are detailed in Exhibit 20. Enrollment increases from roughly 18,000 during the first program year to more than 80,000 at full implementation. There is a major increase in enrollment in the fifth year of implementation when four-year-olds from more affluent households begin to participate.

Exhibit 20. Projected Enrollment in Pre-kindergarten Programs

Program year	4-year olds		3-year olds up to 300% FPL	Total
	Up to 300% FPL (1)	From 300% to 600% FPL		
FY 2021	15,258		2,981	18,239
FY 2022	19,083		5,953	25,036
FY 2023	22,808		8,938	31,746
FY 2024	26,029		11,966	37,995
FY 2025	26,178	16,307	15,049	57,534
FY 2026	28,226	16,419	18,172	62,817
FY 2027	28,351	17,675	21,290	67,316
FY 2028	30,369	17,762	24,431	72,562
FY 2029	30,499	19,038	27,598	77,135
FY 2030	30,630	19,134	30,794	80,558

Source. Kirwan Commission. Note. 1. FPL is the Federal Poverty Level.

Given this substantial population of three-year-olds and four-year-olds who will be enrolled in public-school, it is likely that many of their mothers will choose to enter the labor force. The experience in Washington D.C. suggests that 12 percent of the mothers of these young children would enter the labor force.

An alternative estimate can be derived from the labor force participation rate of mothers of children in the K-12 school system (76.4 percent) versus the rate for mothers of children who are less than three years old: 59.6 percent for married mothers and 67.2 percent for other mothers, generating a weighted average of 62.0 percent. These rates are reflected in Exhibit 19 above and are consistent with a roughly 14 percent increase in the share of mothers participating in the workforce.

These alternative parameters are used to estimate a range for the number of mothers who would enter the workforce during the implementation of pre-kindergarten programs. As reflected in Exhibit 21, the midpoint of this range indicates that more than 2,400 women would enter the workforce in the first program year. By full implementation in the 10th year, Sage estimates that more than 10,600 women would be in the workforce who would otherwise not be.

Exhibit 21. Projected Enrollment in Pre-kindergarten Programs

Program year	Total	Mothers entering workforce		
		Low-end	High-end	Midpoint
FY 2021	18,239	2,201	2,633	2,417
FY 2022	25,036	3,004	3,615	3,309
FY 2023	31,746	3,810	4,583	4,197
FY 2024	37,995	4,559	5,486	5,022
FY 2025	57,534	6,904	8,306	7,605
FY 2026	62,817	7,538	9,069	8,304
FY 2027	67,316	8,078	9,719	8,898
FY 2028	72,562	8,707	10,476	9,592
FY 2029	77,135	9,256	11,136	10,196
FY 2030	80,558	9,667	11,631	10,649

Source. Kirwan Commission, Rasheed Malik, Bureau of Labor Statistics

Given the workforce characteristics of parents cited above, the estimated unemployment rate for these mothers of pre-kindergarten students would be 4.5 percent, the average rate for married mothers and other mothers. Thus, on average, 95.5 percent of the mothers newly entering the workforce would be employed.

According to available data, at least 75 percent of these employed mothers would be working full-time. Factoring in unemployment rates and probabilities of full-time employment, during the first program year of pre-kindergarten more than 1,700 mothers would have entered the workforce as full-time workers, while nearly 600 mothers would be participating in the workforce as part-time workers.

By the 10th year of implementing pre-kindergarten for three-year-olds and four-year-olds, 7,600 mothers would be participating in the workforce as full-time workers while in excess of 2,500 mothers would be part-time workers. From the first year to the 10th year of implementing pre-kindergarten, the number of mothers likely to enter the workforce either as full-time or part-time workers would steadily increase. Exhibit 22 supplies summary statistical detail.

Exhibit 22. Pre-kindergarten Mothers Participating in the Labor Force

Program year	Mothers entering workforce	Employed mothers		
		Total	Full-time	Part-time
FY 2021	2,417	2,308	1,731	577
FY 2022	3,309	3,160	2,370	790
FY 2023	4,197	4,008	3,006	1,002
FY 2024	5,022	4,796	3,597	1,199
FY 2025	7,605	7,263	5,447	1,816
FY 2026	8,304	7,930	5,947	1,982
FY 2027	8,898	8,498	6,373	2,124
FY 2028	9,592	9,160	6,870	2,290
FY 2029	10,196	9,737	7,303	2,434
FY 2030	10,649	10,170	7,627	2,542

Sources. Kirwan Commission, Bureau of Labor Statistics

In 2017, the median hourly wage in Maryland was \$20.68.⁴⁵ This is equivalent to an annual full-time wage of just over \$43,000. Assuming part-time work averaged 20 hours a week, part-time work would generate an annual wage of more than \$21,500. With 75 percent of employed mothers of pre-kindergarten students working full-time, the average for all newly employed mothers of pre-kindergarten students would be approximately \$37,600, assuming that these new workers earn the median wage.

Evidence from Washington, D.C.'s experience with prekindergarten indicates that 40 percent of those entering the labor force because of the new programs were college graduates while almost a quarter had attended college without earning a degree.⁴⁶ Given the earnings power of those with four-year or advanced degrees or some college experience, the use of the median wage to estimate the earnings of these mothers entering or re-entering the labor force is reasonable.

With these wage parameters in hand, total earnings of newly employed mothers of pre-kindergarten students in the first year of the program in Maryland would be approximately \$87 million, growing to \$382 million by the 10th year of implementation. Not only would this translate into higher income taxes, but it would also increase property taxes, sales taxes, and a variety of fees. As indicated in Exhibit 23, earnings and tax payments would expand steadily throughout the first 10 years of implementing the pre-kindergarten program.

Exhibit 23. Earnings and Tax Payments of Employed Mothers (Millions \$2020)

Program year	Employed mothers	Total earnings	State tax	Local tax	Total state and local tax
FY 2021	2,308	\$87.0	\$5.9	\$5.0	\$10.9
FY 2022	3,160	\$118.8	\$8.1	\$6.8	\$14.9
FY 2023	4,008	\$150.6	\$10.3	\$8.6	\$18.9
FY 2024	4,796	\$180.3	\$12.3	\$10.3	\$22.6
FY 2025	7,263	\$273.0	\$18.6	\$15.6	\$34.3
FY 2026	7,930	\$298.0	\$20.3	\$17.1	\$37.4
FY 2027	8,498	\$319.4	\$21.8	\$18.3	\$40.1
FY 2028	9,160	\$344.3	\$23.5	\$19.7	\$43.2
FY 2029	9,737	\$366.0	\$25.0	\$21.0	\$45.9
FY 2030	10,170	\$382.2	\$26.1	\$21.9	\$48.0

Sources. Kirwan Commission, Bureau of Labor Statistics, Comptroller of Maryland

More workers lead to the expansion of businesses and an increase of sales of goods and services. This expansion of business increases demands for the goods and services that these businesses need

⁴⁵ Bureau of Labor Statistics, Occupational Employment Statistics (OES) program.

⁴⁶ Op. cit., Malik, Rasheed

to operate sustainably. These goods and services range widely from office equipment and supplies to utilities and accounting services.

More workers earning more wages and salaries also translate into higher personal income, which augments the spending power that helps to drive Maryland's economy. In the language of economic impact analysis, demands for goods and services that support the supply chain are considered the *indirect* impact of new wages (business-to-business transactions). New demands for goods and services from consumers are considered the *induced* impact. In this instance, the direct impact is attributable to the higher wages earned by mothers of pre-kindergarten students. Then there are the multiplier effects. On average in Maryland, the multiplier effect for income is 41 percent.⁴⁷

The estimated total State and local tax revenues generated by mothers who are entering the workforce because their children are in expanded pre-kindergarten are revealed in Exhibit 24. Total fiscal impacts rise from \$15 million during the first year of pre-kindergarten to \$68 million during the 10th year.

Exhibit 24. Total Fiscal Impacts of Employed Mothers (Millions \$2020)

Program year	Direct fiscal impacts	Indirect and induced fiscal impacts	Total State & local tax
FY 2021	\$10.9	\$4.5	\$15.4
FY 2022	\$14.9	\$6.1	\$21.0
FY 2023	\$18.9	\$7.7	\$26.6
FY 2024	\$22.6	\$9.3	\$31.9
FY 2025	\$34.3	\$14.1	\$48.4
FY 2026	\$37.4	\$15.3	\$52.7
FY 2027	\$40.1	\$16.4	\$56.5
FY 2028	\$43.2	\$17.7	\$60.9
FY 2029	\$45.9	\$18.8	\$64.7
FY 2030	\$48.0	\$19.7	\$67.7

Sources. Kirwan Commission, Bureau of Labor Statistics, Comptroller of Maryland, IMPLAN

⁴⁷ This average of 41 percent is the sum of the indirect effect (15.6 percent) and the induced effect (25.4 percent). Estimates are derived from IMPLAN, LLC, an industry-standard econometric program used to estimate economic impacts of economic activity.

VI. Costs & Benefits of Commission Recommendations

- There are Benefits, and there are Costs

As has been discussed in many contexts, the implementation of Commission recommendations will require significant financial investment in Maryland's pre-k-12 public education system. The Commission has estimated these costs in their report on a yearly basis from FY2020 until FY2030, when the recommendations are fully implemented and costs have achieved something akin to a steady state.

After the Commission calculated costs for each policy area, costs were then reviewed to identify any potential adjustments. This review identified several areas where the activities of recommendations in different policy areas overlapped and costs were double counted. This was particularly the case in Policy Areas 2 and 4 and allowed for significant cost reductions as actions taken to create a high-quality and diverse teaching and school leadership staff interacted with the activities needed to provide the resources needed to make all students successful. This overlap accounted for a majority of cost reductions.

A second area of significant cost reduction was the impact of implementing Commission recommendations on the need for special education services. Research has established that a majority of students in special education programs do not have chronic medical or other conditions (e.g., autism, intellectual disability) that preclude them from success in school.⁴⁸ With the early identification of problems, such as difficulties in learning to read, and the appropriate interventions, the Commission estimates that referrals to special education programs would be substantially reduced. Reductions in special education populations account for roughly one-third of the cost reductions estimated by the Commission.

While the figure of \$3.8 billion is often bandied about in these discussions, this estimate already embodies certain savings such as the predicted large-scale reduction in special education population. Once one deducts those types of presumed cost savings, the cost of full implementation is actually in the range of \$6 billion per annum. But this money does not simply disappear into the ether. Much of it circulates back into Maryland's economy, which in turn creates another set of economic impacts.

⁴⁸ The research on special education and the potential to intervene successfully to reduce the need for special education programs is discussed in a book by a Commission member. Hettelman, Kalman, "Misabeled as Disabled," Radius Book Group, 2019.

Exhibit 25 lists as gross cost the initial implementation cost estimates for each policy area by year. The savings determined for each policy area are also listed, which leads to the net cost per year for overall implementation of each policy area independently. The policy areas are summarized below:

Policy Area 1. Pre-kindergarten programs for three-year-olds and four-year-olds;

Policy Area 2. High quality and diverse teachers and school leaders;

Policy Area 3. College and career readiness pathways (including career and technical education);

Policy Area 4. More resources to ensure all students are successful; and

Policy Area 5. Governance and accountability.

Exhibit 25. Estimated Costs of Implementing each Commission Recommendations (Millions \$2020)

Year		Policy Area 1	Policy Area 2	Policy Area 3	Policy Area 4	Policy Area 5	Gross Cost	Savings	Net Cost
Year 0	FY 2020	\$29	\$173	\$47	\$332	\$1	\$581	\$101	\$480
Year 1	FY 2021	\$162	\$401	\$220	\$884	\$4	\$1,672	\$173	\$1,499
Year 2	FY 2022	\$254	\$731	\$225	\$1,878	\$4	\$3,092	\$409	\$2,684
Year 3	FY 2023	\$363	\$1,014	\$193	\$2,137	\$2	\$3,708	\$629	\$3,079
Year 4	FY 2024	\$410	\$1,347	\$166	\$2,148	\$2	\$4,073	\$879	\$3,194
Year 5	FY 2025	\$427	\$1,594	\$137	\$2,161	\$2	\$4,321	\$1,088	\$3,234
Year 6	FY 2026	\$483	\$1,821	\$139	\$2,172	\$2	\$4,617	\$1,294	\$3,323
Year 7	FY 2027	\$516	\$2,080	\$142	\$2,181	\$2	\$4,921	\$1,520	\$3,401
Year 8	FY 2028	\$586	\$2,344	\$145	\$2,194	\$2	\$5,271	\$1,755	\$3,516
Year 9	FY 2029	\$676	\$2,572	\$148	\$2,207	\$2	\$5,605	\$1,961	\$3,644
Year 10	FY 2030	\$814	\$2,818	\$150	\$2,222	\$2	\$6,006	\$2,174	\$3,832

Source. Kirwan Commission

The overwhelming majority of these expenditures for the Commission recommendations constitutes new demands for public education and support services for public-school students. A smaller proportion of these expenditures are devoted to Judy Centers and Family Support Centers that supply support services to the families of public-school students.

➤ *Benefits and Costs of Commission Recommendations Over Time*

The positive economic impacts of the Commission recommendations are fundamentally driven by the changes that an improved public education system will make in Maryland's economy. By better preparing public-school students for college and careers, Commission recommendations are anticipated to increase the number of college graduates and to decrease the number of public-school students who either fail to complete high school or stop their education at the level of a high school diploma. In better preparing public-school students for careers, the Commission expects recommendations to increase the number of students who earn vocational certificates designed to provide gateways to high-skill, high-earning career ladders. As discussed earlier, these improved educational outcomes can be linked to increases in earnings.

Exhibit 26 summarizes increases in average earnings and associated tax payments for each cohort of Maryland public-school students. As indicated, earnings increase substantially as educational attainment increases. Better-educated Marylanders will have fewer demands for the types of public assistance examined in this report—Medicaid, SNAP, TANF, housing and energy assistance. A more educated citizenry will also place fewer demands on the criminal justice system, notably State prisons. The net effect of these changes is an estimated \$4.5 billion in increased Maryland State and local taxes less assistance over a lifetime for each cohort/year of high school graduates.

Exhibit 26. Impacts of Commission Recommendations on Average Lifetime Earnings and Fiscal Benefits (Millions \$2020)

	Status quo	Future new status	Change
Lifetime earnings with social gain	\$103,181	\$134,065	\$30,884
Lifetime Federal income tax	(\$304)	\$2,848	\$3,151
Lifetime Maryland state and local tax	\$8,921	\$12,540	\$3,619
Cost of public assistance	\$3,213	\$2,328	(\$885)
Total taxes less assistance	\$5,405	\$13,060	\$7,655
Maryland taxes less assistance	\$5,708	\$10,212	\$4,504
Multiplier effect	\$2,339	\$4,184	\$1,845
Total impact	\$8,047	\$14,396	\$6,349

Sources. Federal Reserve Board of Richmond, U.S. Census, eFile, Comptroller of Maryland

Additional spending of all these workers in the Maryland consumer economy will support additional impacts to these earnings. According to Sage estimates, these multiplier effects will increase impacts listed in the exhibit above by 41 percent.

As discussed above, this multiplier effect increases both earnings and tax payments. The total value of lifetime Maryland taxes less public assistance costs is estimated to increase from \$8.05 billion to \$14.40 billion for each cohort of Maryland public-school students when full effects of Commission

recommendations are realized. Thus, full implementation of Commission recommendations is estimated to increase net tax revenues to state and local government in Maryland by \$6.35 billion.

These impacts will phase in over a relatively long period of time. It is expected that it will take 10 years for Commission recommendations to be fully implemented. By the end of that 10-year period, the Commission expects that 80 percent of high school graduates will be college and career ready. The end of the initial 10-year implementation period also coincides with an opportunity for students who graduated during early years of implementation to have completed two- or four-year degrees.

Four years after full implementation comes another milestone as the 80 percent of students who were college and career ready have had time to complete undergraduate education. Finally, eight years after full implementation, students who have chosen to pursue an advanced degree would have had time to complete that education, at least in many instances.

Exhibit 27 summarizes estimated changes in educational attainment associated with each of these milestones and compares them to current outcomes. As educational attainment increases, the average income that each cohort of public-school students earns also increases. This increase in average income is a measure of how much of the ultimate effects of the Commission recommendations is realized at each milestone. As shown, an estimated 6 percent of final income impacts are realized in 2025. This increases to 33 percent of final income impacts by 2030, 60 percent in 2034, and 100 percent in 2038.

Exhibit 27. Milestones in Commission Impacts and Effects on Educational Attainment

	Status quo	Initial secondary school impact	80% college & career ready	80% college & career ready plus 4 years	80% college & career ready plus 8 years
Year of milestone	2014	2025	2030	2034	2038
Graduate or Professional degree	9.3%	9.3%	11.6%	14.0%	18.6%
Bachelor's degree	15.8%	15.8%	19.8%	23.7%	31.6%
Some college or Associate degree	39.9%	45.6%	45.1%	44.9%	32.3%
High school or equivalent	22.0%	18.3%	14.7%	11.0%	11.0%
Less than a high school diploma	13.0%	10.9%	8.9%	6.5%	6.5%
<i>Total</i>	<i>100.0%</i>	<i>100.0%</i>	<i>100.0%</i>	<i>100.0%</i>	<i>100.0%</i>
Weighted average income	\$49,983	\$50,719	\$53,739	\$56,818	\$61,387
Change in weighted average income	\$0	\$736	\$3,756	\$6,835	\$11,404
Share of final impact	0%	6%	33%	60%	100%

Sources. Commission, Sage

These increases in average income stand to expand state and local tax collections in Maryland. Exhibit 28 estimates the net costs and benefits of implementing Commission recommendations from FY 2020 to FY 2050. This long period reflects the fact that some students who will benefit from Commission recommendations for prekindergarten will not reach adulthood and their final levels of educational attainment for decades. The exhibit lists the costs of Commission recommendations, the fiscal benefits associated with the opportunities for parents of pre-kindergarten students to enter the workforce, and the fiscal benefits of improved educational outcomes.

This analysis based estimated tax payments for each income level on a joint return with one dependent under the age of 18 years. Thus, estimates include the tax benefits of married couples and tax credits provided for children. It is almost certain that some filers from these cohorts would be single and pay substantially higher tax rates while married filers would not always have young dependents. For State and local taxes, the higher rates for single filers could increase tax obligations by at least 12 percent for those with college degrees and well over 30 percent for those whose education stopped at high school. Federal tax payments would increase even more. If, for example, 10 percent of filers were single, Maryland State and local tax revenue might increase by 4 percent. Thus, these estimated benefits summarized in Exhibit 28 almost certainly underestimate the total increase in tax payments that Maryland State and local governments would collect in the future when the effects of all Commission recommendations are realized.

Fiscal benefits of better educational outcomes and more elevated attainment include not only the higher tax payments associated with the higher earning power of future Maryland public-school students, but also the productivity effects derived from the probability of increased business investment and greater opportunities for workers to learn from one another, the decrease in the need for public assistance and services assessed here, and multiplier effects on the direct benefits of higher earnings of future Maryland public-school students.

Estimated benefits could easily prove conservative. Better educated citizens tend to place many fewer demands on government for assistance. This analysis has captured some of these diminished demands, but likely fails to capture the full extent of reduced demands for State and local spending. This is particularly true for criminal justice and public safety spending. The analysis estimates reduced demands for State prisons but did not attempt to estimate the likely reductions in costs for police, courts, and local jails.

Another area where benefits are likely underestimated is health and medical care. The analysis focuses on reduced spending for Medicaid which provides health insurance to low-income

individuals. The research literature is consistent in its findings that better education leads to better health and health-related outcomes like lower rates of obesity and diabetes, fewer teen pregnancies, and improved behavioral health, to name a few. While Medicaid spending will reflect many of these reduced costs, other benefits will almost certainly be realized. These include lower rates of uncompensated care by hospitals as fewer people use emergency departments for primary care, fewer demands for emergency medical services provided by fire departments, and so on.

Another potential source of impacts greater than those estimated here is the economic effects of a greatly increased share of students who earn vocational certificates, participate in apprenticeships, or achieve other industry-recognized documentation of job readiness. There are clear examples of this pathway to jobs that earn on a level with four-year college graduates, but no comprehensive data regarding the expected earnings of those who choose these types of vocational pathways rather than traditional measures of educational attainment. As noted above, the analysis may underestimate the future earnings of these individuals.

There is a period during which costs far exceed benefits as Kirwan Commission recommendations are implemented and relatively few Marylanders are positioned to benefit from implementation as they remain in school. By FY 2038, fiscal benefits have peaked. As shown, costs increase from FY 2020 to FY 2030, at which point recommendations are fully implemented and costs thereafter are level. Fiscal benefits associated with prekindergarten workforce impacts also increase from FY 2021 until FY 2030, at which point these benefits level off. Fiscal benefits from better school outcomes commence in FY 2022 as more students remain in high school and an increasing number of students graduate from high school. These fiscal benefits increase until FY 2038 at which point it is estimated that full benefits of the Commission recommendations are realized.

These increasing fiscal benefits first exceed the cost of the Commission recommendations as early as FY 2034. Thereafter, the annual net cost of the recommendations is negative, that is, benefits exceed costs on an annual basis. The cumulative costs, however, reflect the mounting costs over the initial decade and a half that costs exceed fiscal benefits.

By FY 2034, as annual fiscal benefits exceed annual costs, these cumulative costs begin to decrease. By FY 2046, Maryland's economy is large enough and worker earnings are high enough such that the cumulative net fiscal benefits turn positive. At that point, the net benefits are presumed to continue into economic perpetuity at \$2.6 billion annually. At that point, Maryland's economy would be on a different path altogether.

Exhibit 28. Estimated Net Costs and Fiscal Benefits of Implementing the Commission Recommendations
(Millions \$2020)

Year	Costs	Prekindergarten workforce fiscal benefits	Better school outcome fiscal benefits	Annual net cost	Cumulative net cost
FY 2020	\$480	\$0	\$0	\$480	\$480
FY 2021	\$1,499	\$15	\$0	\$1,484	\$1,964
FY 2022	\$2,684	\$21	\$102	\$2,560	\$4,524
FY 2023	\$3,079	\$27	\$205	\$2,847	\$7,371
FY 2024	\$3,194	\$32	\$307	\$2,855	\$10,226
FY 2025	\$3,234	\$48	\$410	\$2,776	\$13,001
FY 2026	\$3,323	\$53	\$746	\$2,524	\$15,526
FY 2027	\$3,401	\$57	\$1,082	\$2,262	\$17,788
FY 2028	\$3,516	\$61	\$1,419	\$2,036	\$19,824
FY 2029	\$3,644	\$65	\$1,755	\$1,825	\$21,649
FY 2030	\$3,832	\$68	\$2,091	\$1,673	\$23,322
FY 2031	\$3,832	\$68	\$2,520	\$1,244	\$24,566
FY 2032	\$3,832	\$68	\$2,948	\$816	\$25,382
FY 2033	\$3,832	\$68	\$3,377	\$387	\$25,769
FY 2034	\$3,832	\$68	\$3,805	(\$41)	\$25,727
FY 2035	\$3,832	\$68	\$4,441	(\$677)	\$25,050
FY 2036	\$3,832	\$68	\$5,077	(\$1,313)	\$23,737
FY 2037	\$3,832	\$68	\$5,713	(\$1,949)	\$21,787
FY 2038	\$3,832	\$68	\$6,349	(\$2,585)	\$19,202
FY 2039	\$3,832	\$68	\$6,349	(\$2,585)	\$16,617
FY 2040	\$3,832	\$68	\$6,349	(\$2,585)	\$14,031
FY 2041	\$3,832	\$68	\$6,349	(\$2,585)	\$11,446
FY 2042	\$3,832	\$68	\$6,349	(\$2,585)	\$8,861
FY 2043	\$3,832	\$68	\$6,349	(\$2,585)	\$6,276
FY 2044	\$3,832	\$68	\$6,349	(\$2,585)	\$3,690
FY 2045	\$3,832	\$68	\$6,349	(\$2,585)	\$1,105
FY 2046	\$3,832	\$68	\$6,349	(\$2,585)	(\$1,480)
FY 2047	\$3,832	\$68	\$6,349	(\$2,585)	(\$4,066)
FY 2048	\$3,832	\$68	\$6,349	(\$2,585)	(\$6,651)
FY 2049	\$3,832	\$68	\$6,349	(\$2,585)	(\$9,236)
FY 2050	\$3,832	\$68	\$6,349	(\$2,585)	(\$11,822)

Source. Commission, Sage

Conclusion

Maryland's current educational outcomes are mediocre and disparities are massive. The Kirwan Commission has recommended a set of interventions designed to better prepare Maryland's public-school students at every grade level and upon graduation. In this report, Sage translates estimates of improved educational outcomes as interventions are implemented into economic and fiscal ones.

Projected benefits come with costs. By FY 2033, Sage estimates that State and local authorities will have cumulatively invested \$25.8 billion more in public education than they will have received in offsetting revenues through expanded earnings and higher labor force participation. But thereafter, cumulative costs decline as annual fiscal benefits come to exceed annual implementation costs. By FY 2038, the level of annual fiscal benefit to State and local governments peaks and by FY 2046, Maryland will have more than fully recovered its expanded investment in preK-12 education.

Appendices

Educational attainment has very broad effects on a populace. Most well-known is the correlation between higher levels of educational attainment and higher earning power. As discussed in the main body of this report, there are also correlations (often inverse) between educational attainment and the need for public assistance in various forms as well as the likelihood that individuals will be involved in the criminal justice system.

These Appendices supply additional background information regarding these topics. Much of this information has typically been used in summary form in the main body of the report.

➤ *Educational Attainment & Lifetime Earnings*

Maryland is home to many well-educated people. Indeed, according to one recent assessment, Maryland is the second most educated state in the nation after Massachusetts.⁴⁹ Exhibit A-1 reflects the educational attainment of Maryland's adult population over nearly half a century. The proportion of that population that has a college degree has almost tripled, while the category that encompasses those with less than a high school diploma has dropped from almost half the population to just 10 percent of the population.

Exhibit A-1. Maryland Educational Attainment Trends, 1970-2017

Educational attainment	1970	1980	1990	2000	2010	2017
College degree	13.9%	20.4%	26.5%	31.4%	35.8%	39.7%
Some college	9.9%	14.6%	23.9%	25.7%	25.6%	25.8%
HS	28.4%	32.5%	28.2%	26.7%	26.4%	24.5%
Less than HS	47.6%	32.6%	21.6%	16.2%	12.2%	10.1%

Source. Federal Reserve Bank of Richmond

As the home of many well-educated adults, it is logical that the educational attainment of Marylanders exceeds that of the typical American adult. Exhibit A-2 compares educational attainment in Maryland to that of the nation as a whole. Maryland has consistently registered a higher proportion of adults with a college degree and a lower proportion of those with only some college experience, a high school diploma, or less than a high school diploma.

⁴⁹ Hess, Abigail, "The 10 most and least educated states in 2018," January 23, 2018, CNBC. <https://www.cnbc.com/2018/01/23/the-10-most-and-least-educated-states-in-2018.html>.

Exhibit A-2. Maryland Educational Attainment as Percentage of U.S., 1970-2017

Educational attainment	1970	1980	1990	2000	2010	2017
College degree	129.9%	125.9%	130.5%	128.7%	127.4%	124.1%
Some college	93.4%	93.0%	96.0%	93.8%	88.6%	89.3%
HS	91.3%	93.9%	47.0%	93.4%	102.1%	90.4%
Less than HS	99.8%	97.3%	87.1%	82.7%	84.7%	84.2%

Source. Federal Reserve Bank of Richmond

Not only are citizens of Maryland more likely to be associated with higher educational attainment, they are also likely to earn more than the typical, comparably educated American. As reflected in Exhibit A-3, Maryland residents consistently out-earn typical American workers at every level of educational attainment. Unemployment rates for Marylanders with college degrees from four-year situations were somewhat lower than typical American with such college degrees, while Marylanders with no more than an Associate degree had slightly higher rates of unemployment compared to typical Americans. Adults in Maryland were consistently more likely to participate in the labor force than typical Americans regardless of their level of educational attainment.

Exhibit A-3. Median Earnings and Workforce Characteristics, Maryland v. US, 2017

Educational attainment	Median earnings		Unemployment rate		Labor force participation rate	
	MD	U.S.	MD	U.S.	MD	U.S.
Graduate or Professional degree	\$82,432	\$70,097	2.3%	2.6%	89.6%	86.6%
Bachelor's degree	\$61,640	\$52,484	2.3%	2.6%	89.6%	86.6%
Some college or Associate degree	\$42,707	\$36,190	4.4%	4.3%	82.6%	79.2%
High school or equivalent	\$35,409	\$30,624	6.5%	5.7%	76.0%	72.2%
Less than a high school diploma	\$26,309	\$23,031	8.6%	8.0%	63.8%	60.2%

Source. Federal Reserve Bank of Richmond

The median is the value which separates any population into two equal halves. With earnings, the average is often significantly different than the median. Exhibit A-4 compares median and average earnings of all U.S. adults by educational attainment. As indicated, the discrepancy between average and median earnings can be substantial, but in some cases, for example, for those with less than a high school degree, the median and average are close since relatively few members of this demographic segment earn significant amounts of money.

Exhibit A-4. Estimated Average Earnings by Educational Attainment

Educational attainment	U.S. earnings		Average as share of median
	Median	Average	
Doctoral degree	\$90,636	\$120,954	133%
Professional degree	\$95,472	\$140,003	147%
Master's degree	\$72,852	\$87,880	121%
Bachelor's degree	\$60,996	\$68,252	112%
Associate degree	\$43,472	\$45,637	105%
Some college, no degree	\$40,248	\$38,184	95%
High school or equivalent	\$37,024	\$38,006	103%
Less than a high school diploma	\$27,040	\$26,513	98%
Weighted average	\$47,164	\$53,536	114%

Source. Bureau of Labor Statistics, U.S. Census

Exhibit A-5 utilizes national data regarding median and average earnings to adjust median earnings in Maryland to average earnings. Because national data disaggregate categories of educational attainment into a finer level of detail, weighted averages, based on the number of workers at each educational level, are used for the earnings of those with advanced degrees and those with some college or an Associate degree. The average earnings in Exhibit A-5 are used to estimate the earnings of current Maryland public-school students and future Maryland public-school students after Commission recommendations have been fully implemented.

Exhibit A-5. Median and Average Earnings by Educational Attainment, Maryland, 2017

Educational attainment	Median earnings	Adjustment factor	Average earnings
Graduate or Professional degree	\$82,432	125.6%	\$103,549
Bachelor's degree	\$61,640	111.9%	\$68,973
Some college or Associate degree	\$42,707	98.6%	\$42,098
High school or equivalent	\$35,409	102.7%	\$36,348
Less than a high school diploma	\$26,309	98.1%	\$25,796

Source. Federal Reserve Bank of Richmond

Using the median earnings reflected in Exhibit A-3, the net present value (NPV) of lifetime earnings can be estimated. Exhibit A-6 lists those median earnings as well as the likely span of years that Marylanders will spend in the labor force. It is assumed that high school dropouts begin work at age 18, those with a high school diploma or its equivalent begin work at age 19, those with an Associate degree at age 21, those with a Bachelor's degree at age 23, and those with an advanced degree at age 26. In each instance, it is assumed that workers retire at age 65. Consequently, greater educational attainment reduces the number of years that one participates in the labor force. Nevertheless, higher earnings associated with greater educational attainment more than countervail reductions in the number of presumed years in the workforce.

Exhibit A-6. Lifetime Earnings of Maryland Adults

Educational attainment	Median earnings	Age at starting work	Years in labor force	NPV (millions)
Graduate or Professional degree	\$82,432	26	40	\$1.91
Bachelor's degree	\$61,640	23	43	\$1.50
Some college or Associate degree	\$42,707	21	45	\$0.96
High school or equivalent	\$35,409	19	47	\$0.74
Less than a high school diploma	\$26,309	18	48	\$0.46

Source. Federal Reserve Bank of Richmond, Sage

➤ *Educational Attainment & Social Impacts*

An assessment of the impacts of Commission recommendations depends on an understanding of what higher educational attainment means for the population of Marylanders who attend public-schools. This in turn requires an estimate of the demands this population would place on public assistance and government services and how that might change with better educational outcomes.

Accordingly, this analysis has focused on quantifying the costs of supplying government services and allocating these costs to populations divided by educational attainment on a per capita basis. The following discussion provides additional background regarding these costs and their allocation by educational attainment.

Because more education is directly correlated with more income, it is unsurprising that those with more education place fewer demands on government for public assistance. Exhibit A-7 summarizes the relationship between educational attainment and the receipt of government means-tested assistance by families. As indicated, there is a disproportionate reliance on government assistance among those with less education. For example, 11 percent of all families fell into the category of less than a high school diploma, but those families represented 21 percent of all families receiving public assistance. Alternatively, 36 percent of families were categorized as having at least a four-year college degree, but only constituted 12 percent of families receiving assistance.

Exhibit A-7. Characteristics of U.S. Families with Children Under 18, by Receipt of Government Means-Tested Assistance, 2014

Item	All	Families receiving		Type of family receiving assistance	
		No assistance	Assistance	1-parent	2-parent
Number of families (000)	31,596	24,931	6,665	3,037	3,628
Education (reference person):					
Less than high school	11.5%	9.1%	20.8%	18.9%	22.5%
High school graduate	21.8%	18.1%	35.7%	40.4%	31.9%
Some college or associate degree	30.7%	30.4%	31.8%	34.1%	29.9%
Bachelor's degree or higher	35.9%	42.4%	11.6%	6.7%	15.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Source. Bureau of Labor Statistics

Note. Numbers may not add due to rounding.

Similarly, the more education one receives, the less likely it is that one is living in poverty. In 2017, almost one in four adults with less than a high school diploma was living in poverty. By stark contrast, fewer than 5 percent of adults with at least a four-year college degree were living in poverty. See Exhibit A-8.

Exhibit A-8. Educational Attainment and Poverty, 2017

Educational Attainment	Total number of persons (000)	Persons in poverty (000)	Share of cohort
Less than high school	22,411	5,485	24.5%
High school graduate	62,685	7,942	12.7%
Some college or associate degree	57,810	5,075	8.8%
Bachelor's degree or higher	76,924	3,661	4.8%
Total	219,830	22,163	10.1%

Source. U.S. Census Bureau, Current Population Survey.

A more specific look at the types of public assistance and the likelihood receiving that assistance is presented in Exhibit A-9. The exhibit presents the proportion of adults aged 25 through 34 who receive food stamps, Medicaid, or public welfare/assistance. For each of these types of public assistance, the likelihood of being a recipient declines as educational achievement increases. For those failing to complete high school, 38 percent receive food stamps and 34 percent are covered by Medicaid. At the other end of the spectrum, those with advanced graduate degrees, 3 percent receive food stamps and 4 percent are covered by Medicaid. A much smaller share of adults 25 through 34 received public welfare/assistance, but, as with other assistance, the proportion decreases with more educational attainment.

Exhibit A-9. Educational Attainment and Public Assistance, U.S. 2016, Receipt of Select Governmental Assistance by Level of Education, Ages 25–34 (Percent Receiving Public Assistance)

Characteristic	No HS diploma	HS grad, only	Some college, no degree	Associate degree	Bachelor's degree +	Graduate
Food stamps (SNAP)	38%	26%	19%	13%	5%	3%
Medicaid	34%	26%	20%	14%	6%	4%
Public Assistance (including TANF)	4%	3%	2%	2%	1%	0%

Source. U.S. Census Bureau, American Community Survey; Urban Institute

Food stamps are provided through a program commonly known as SNAP. In 2017, 11 percent of Maryland's population received these benefits. The average monthly benefit to an individual recipient was \$120. These numbers were slightly lower than national averages as shown in Exhibit A-10.

Exhibit A-10. SNAP in Maryland, 2017

	<i>Recipients</i>	<i>Share of population</i>	<i>Average monthly SNAP benefit</i>					
			<i>Per HH member</i>	<i>Per HH</i>	<i>Per HH with kids</i>	<i>Per working HH</i>	<i>Per senior HH</i>	<i>Per non-elderly disabled HH</i>
MD	684,000	11%	\$120	\$221	\$371	\$278	\$100	\$164
US	42,000,000	13%	\$126					

Source. Center on Budget and Policy Priorities, Maryland SNAP Fact Sheet

Today, public welfare is known as Temporary Assistance to Needy Families (TANF). In 2016/2017, more than 20,000 Maryland families received TANF. Families receiving this form of public assistance represented 39 percent of all Maryland families in poverty at that time. The average Maryland benefit was \$677/month, which represented 39 percent of the value of the federal poverty level for those recipients. See Exhibit A-11.

Exhibit A-11. TANF in Maryland, 2016/2017

	<i>Poor families receiving TANF</i>	<i>MD families 2016/2017</i>			<i>Maryland TANF benefit level</i>	<i>Share of federal poverty level</i>
		<i>on AFDC/TANF</i>	<i>in poverty</i>	<i>in deep poverty</i>		
MD	39%	20,185	51,858	16,311	\$677	39%
US	23%					

Source. Center on Budget and Policy Priorities, Maryland TANF Fact Sheet

In June 2019, more than 1.3 million Maryland residents were enrolled either in Medicaid or CHIP, of which the latter serves children. As indicated in Exhibit A-12, the cost of Medicaid per enrollee in FY 2019 was \$7,726. The federal government covers much of this expense.

Exhibit A-12. Medicaid in Maryland

	<i>Total Medicaid & CHIP Enrollment (Preliminary) June 2019</i>	<i>TOTAL Medicaid budget in FY19 (000)</i>	<i>Federal share (000)</i>	<i>Maryland share (000)</i>
MD	1,313,070	\$10,144,909	6,184,534	\$3,960,375
Per enrollee		\$7,726	\$4,710	\$3,016

Source. Kaiser Family Foundation, Maryland Department of Health

The U.S. Census Bureau collects information regarding educational attainment and health insurance. Consistent with other characteristics, greater education is associated with greater health insurance coverage, particularly private insurance and employer-provided insurance. Conversely, coverage by Medicaid was inversely correlated with educational attainment, with 29 percent of those without a high school diploma being covered by Medicaid and 6 percent of those with at least a Bachelor's degree were covered by Medicaid. Exhibit A-13 supplies detailed information regarding the statistical connections between health insurance and educational attainment.

Exhibit A-13. Educational Attainment and Health Insurance in the U.S., 2017

Characteristic	Total	No HS diploma	HS grad, only	Some college, no degree	Associate degree	Bachelor's degree +
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Not covered at any time during the year	9.9%	18.2%	12.4%	9.7%	8.3%	5.3%
Covered by some type of health insur. during the year	90.1%	81.8%	87.6%	90.3%	91.7%	94.7%
Covered by private insurance	68.4%	42.4%	60.8%	68.8%	72.7%	82.4%
Covered by Employment based	55.9%	31.4%	47.3%	56.0%	60.5%	70.3%
Covered by Own Employment based	36.8%	15.5%	30.9%	31.3%	41.0%	51.2%
Covered by Direct-purchase insurance	17.5%	14.7%	18.0%	17.7%	17.4%	18.0%
Covered by government health plan	36.4%	52.2%	42.8%	36.4%	32.8%	26.4%
Covered by Medicaid	13.7%	28.6%	17.1%	14.4%	10.9%	6.1%
Covered by Medicare	22.2%	29.3%	26.2%	19.8%	19.9%	18.2%
Covered by military related health care	4.8%	2.7%	4.5%	6.2%	6.0%	4.6%
Covered by Medicaid and private insurance	3.6%	4.7%	4.3%	4.1%	3.3%	2.5%
Covered by Medicare and private insurance	10.2%	8.3%	11.2%	9.6%	9.4%	10.5%
Covered by Medicare and Medicaid	2.4%	6.9%	3.0%	1.8%	1.9%	0.9%

Source. U.S. Census Bureau, Current Population Survey, 2018 Annual Social and Economic Supplement. Table HI01. Health Insurance Coverage Status and Type of Coverage by Selected Characteristics: 2017. Note. Estimates by type of coverage are not mutually exclusive; people can be covered by more than one type of health insurance during the year.

State and local governments in Maryland spend considerable portions of their revenue on housing programs to address homelessness, encourage affordable housing, and provide subsidies to low income renters. They also provide assistance with energy costs. State programs are operated by the departments of Maryland Housing and Community Development (MHCD) and Maryland Human Services (MHS). Exhibit A-14 summarizes spending for FY 2018, which totals in excess of \$450 million. This analysis assumes that these expenditures are allocated in a manner similar to expenditures on SNAP.

Exhibit A-14. State and Local Spending on Housing and Energy Assistance

	FY 2018 Budget (millions)
Housing and Building Energy Programs, MHCD	\$40.9
Rental Services MHCD	\$270.5
Energy assistance, MHS	\$59.4
Dev. and Public Housing, Counties	\$82.8
Total	\$453.5

Sources. Maryland state budget, Maryland Association of Counties

➤ *Educational Attainment & Incarceration*

Another way in which educational attainment affects government expenditures is found in the criminal justice system. There are clear and consistent data across the US as well as in some states demonstrating that a very high proportion of incarcerated men and women failed to complete high school. Exhibit A-15 summarizes national data as well as data for Georgia and Maryland linking educational attainment and incarceration.

A 2012 report by a task force established by the Maryland Legislature found that 57 percent of state prisoners under the age of 25 had failed high school and another 17 percent only had a high school diploma. This share of Maryland prisoners under the age of 25 who had not finished high school was higher than for the national population and for Georgia based on a report specific to that state. Nevertheless, the overall picture of lower educational attainment and higher rates of incarceration is consistent across communities.

Exhibit A-15. Educational Attainment and Incarceration

Popula- tion	Year	Who	Total number	Less than HS	HS diploma	GED	Some college or tech	Completed tech	College degree
US	2009	All male state prisoners	1,122,011	39.5%	15.8%	22.3%	22.4%	-	-
US	2004	All male state prisoners	1,124,000	36.3%	21.7%	30.5%	11.5%	-	-
US	2009	Incarcerated men	1,947,103	40.2%	17.4%	19.8%	22.6%	-	-
US	2009	Incarcerated women	195,927	36.5%	17.1%	16.0%	30.5%	-	-
Georgia	2016	All state prisoners	14,888	49.6%	39.5%		9.0%	0.5%	1.5%
Maryland	2011	State prisoners < 25 years old	2,195	57.2%	17.1%	-	-	-	-

Sources. Prison Policy Initiative, Georgia Department of Corrections, Maryland Task Force to Study High School Dropout Rates of Persons in the Criminal Justice System

The analysis presented in this report focuses on the costs for public services, including incarceration, on the basis of the average adult in Maryland. Exhibit A-16 presents data to estimate the likelihood that an adult in Maryland would be incarcerated by level of educational attainment. As indicated, the share of the population that is incarcerated decreases substantially with higher levels of education. Thus, only 0.3 percent of adult Marylanders with a high school diploma, but no college are incarcerated. This share increases slightly to 0.4 percent of adult Marylanders who attended college but did not earn a degree, but then drops to 0.1 percent of adult Marylanders who received a degree from a two-year or four-year college. On average, 0.4 percent of the Maryland population 25 years and older is incarcerated.

Exhibit A-16. Maryland Population 25 Years and Older and Incarceration, 2017

	Total population	Incarcerated population	Share of population 25 years and older that is incarcerated
Less than a high school diploma	417,716	9,492	2.3%
High school diploma, no college	1,027,608	2,854	0.3%
Some college, no degree	786,290	3,153	0.4%
Associate degree	266,816	1,095	0.1%
Bachelor's degree	860,298		
Advanced degree	736,699		
Total	4,095,427	16,594	0.4%

Sources. U.S. Census Bureau, Maryland Task Force to Study High School Dropout Rates of Persons in the Criminal Justice System, Sage

Incarceration is expensive. In FY2018, Maryland spent \$870 million on prison operations, construction, and maintenance. The total prison population in FY2018 was 18,635. In other words, the State of Maryland spent almost \$47,000 for each prisoner that year. Prisoners are generally released to some type of community supervision, parole, or probation. These costs exceeded \$122 million or more than \$3,000 for each individual under community supervision. See Exhibit A-17.

Exhibit A-17. State Incarceration and Community Supervision Costs, FY2018

Factor	Value
Prison operations, capital construction, facilities maintenance	\$870,900,867
No. of incarcerated	18,635
Cost per prisoner	\$46,735
Total cost: Community supervision, parole and probation	\$122,335,415
Number. under community supervision, parole and probation	39,134
Cost per person under community supervision	\$3,126

Sources. Maryland Department of Public Safety and Correctional Services, Sage

The Maryland Department of Public Safety and Correctional Services reports that the average length of stay for a state prisoner in FY2018 was 82 months, nearly 7 years. The most recent data from the Department of Corrections indicate that roughly 40 percent of prisoners who are released returned to prison within three years. For purposes of this analysis regarding the economic implications of

implementing Kirwan Commission recommendations with fidelity, it is assumed that when released, the typical prisoner falls under community supervision for at least one year. These data allow for an estimation of the incarceration costs per state prisoner in Maryland.

Exhibit A-18 presents a stream of costs that permit a net present value of incarceration computation. The calculation assumes that a typical prisoner spends seven years in a state prison followed by one year of community supervision. Three years after release, the calculation assumes that there is a 40.5 percent probability that this prisoner will return to prison for another seven years, followed by yet another year of community supervision. The calculation also assumes that current costs (from FY2018) increase at a rate of 2 percent annually.

The exhibit then lays out an 18-year stream of costs associated with a hypothetical prisoner. The first seven years represent full costs of incarcerating a state prisoner. The eighth year is the cost of one year of community supervision followed by two years of no cost. In years 11 through 17, 40.5 percent of the inflation-adjusted annual cost of incarceration is incurred followed by one year of community supervision. The net present value of this stream of costs over 18 years is \$386,130.

Exhibit A-18. Lifetime State Incarceration and Community Supervision Costs per Prisoner

Year	Incarceration costs	Parole probation costs	Costs assigned to typical prisoner
1	\$46,735	\$3,126	\$46,735
2	\$47,669	\$3,189	\$47,669
3	\$48,623	\$3,252	\$48,623
4	\$49,595	\$3,317	\$49,595
5	\$50,587	\$3,384	\$50,587
6	\$51,599	\$3,451	\$51,599
7	\$52,631	\$3,520	\$52,631
8	\$53,683	\$3,591	\$3,591
9	\$54,757	\$3,663	\$0
10	\$55,852	\$3,736	\$0
11	\$56,969	\$3,811	\$23,073
12	\$58,109	\$3,887	\$23,534
13	\$59,271	\$3,965	\$24,005
14	\$60,456	\$4,044	\$24,485
15	\$61,665	\$4,125	\$24,974
16	\$62,899	\$4,207	\$25,474
17	\$64,157	\$4,291	\$25,983
18		\$4,377	\$4,377
Net present value	-	-	\$386,130

Sources. Maryland Department of Public Safety and Correctional Services, Sage

This computed net present value cost for incarceration and community supervision and the earlier calculation of the proportion of adult Marylanders who are incarcerated allows for an estimate of the average lifetime incarceration and community supervision costs for each adult Marylander. These estimates are presented in Exhibit A-19.

Because 2.27 percent of adult Marylanders with less than a high school diploma are incarcerated, 2.27 percent of the lifetime cost of this incarceration and community supervision are assigned to the average adult Marylander without a high school diploma. Similar calculations are generated for adult Marylanders with a high school diploma or its equivalent, some college but no degree, and a college degree. As indicated, the cost per adult Marylander drops radically with educational attainment, falling to \$199 for those with a high school diploma, five dollars to those with some college, and essentially zero for those who have a college degree.

Exhibit A-19. Lifetime State Incarceration and Community Supervision Costs per Adult Marylander

Educational attainment	Less than a HS diploma	HS diploma, no college	Some college, no degree	College degree
Share of general population 25 years and older	2.27%	0.28%	0.40%	0.06%
Share of NPV of lifetime incarceration & community support costs	\$8,774	\$199	\$5	\$0

Sources. Maryland Department of Public Safety and Correctional Services, Sage

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